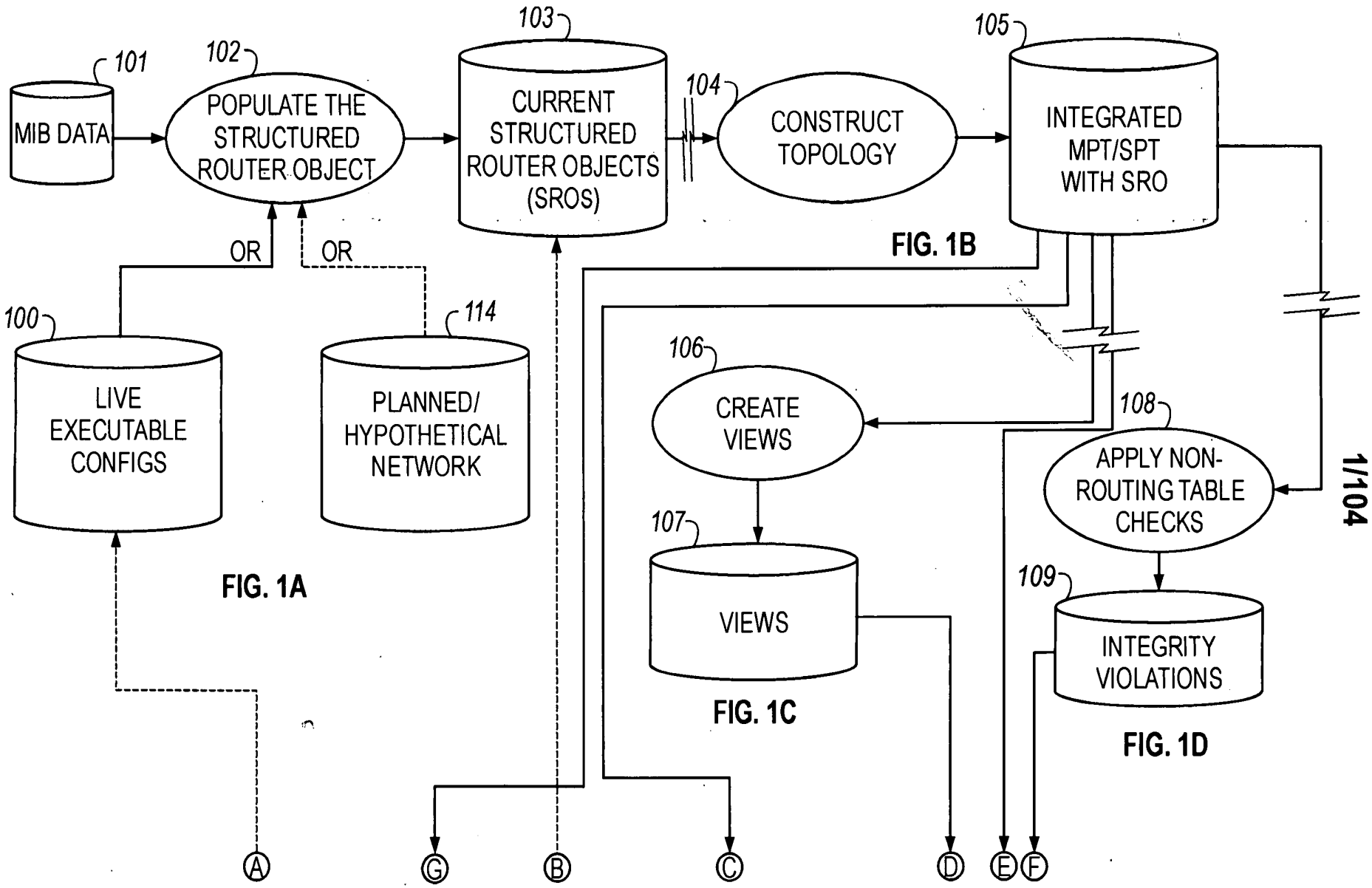


FIG. 1A

FIG. 1B

FIG. 1C

FIG. 1D

1/104

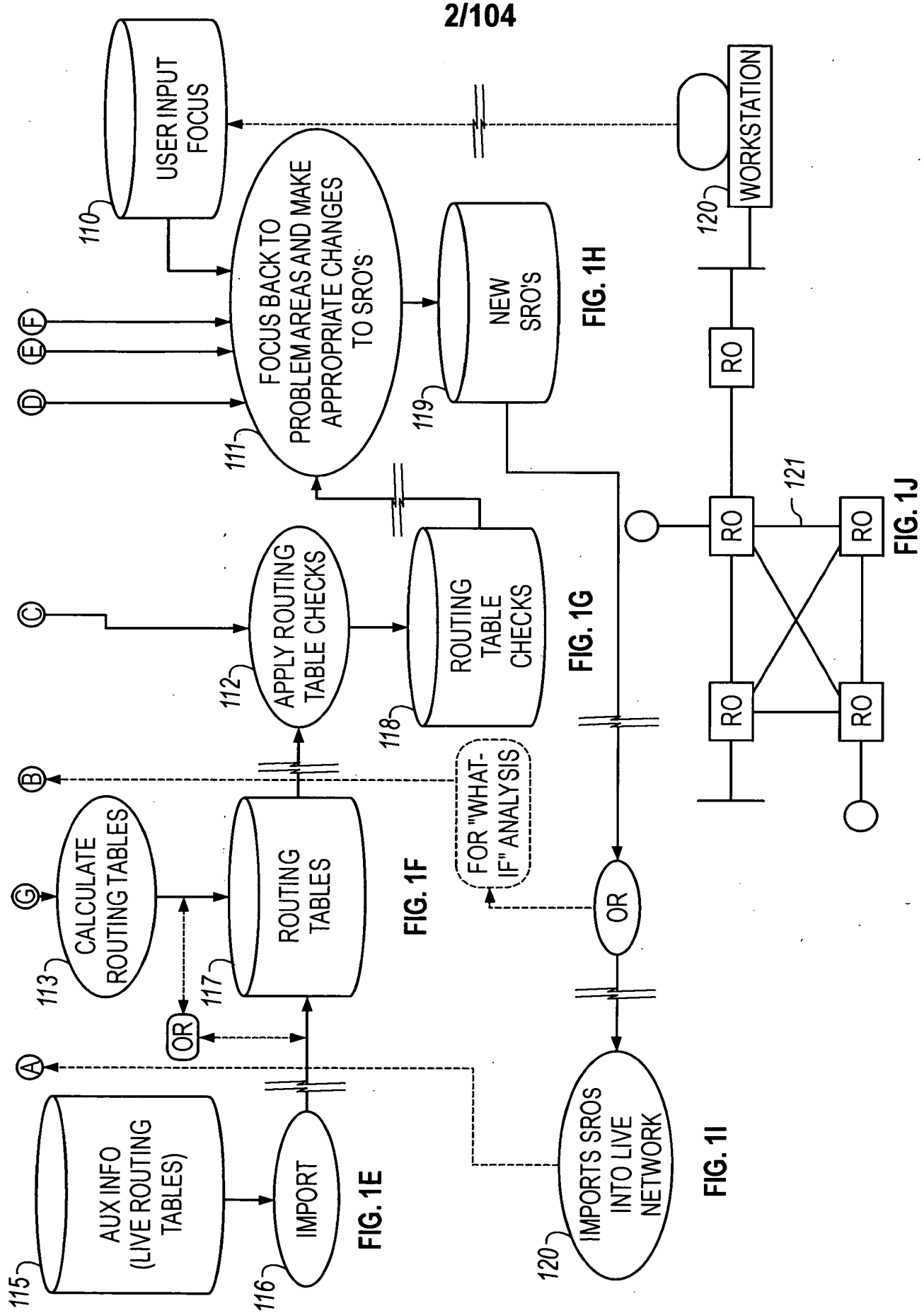


FIG. 1H

FIG. 1J

FIG. 1G

FIG. 1F

FIG. 1I

FIG. 1E

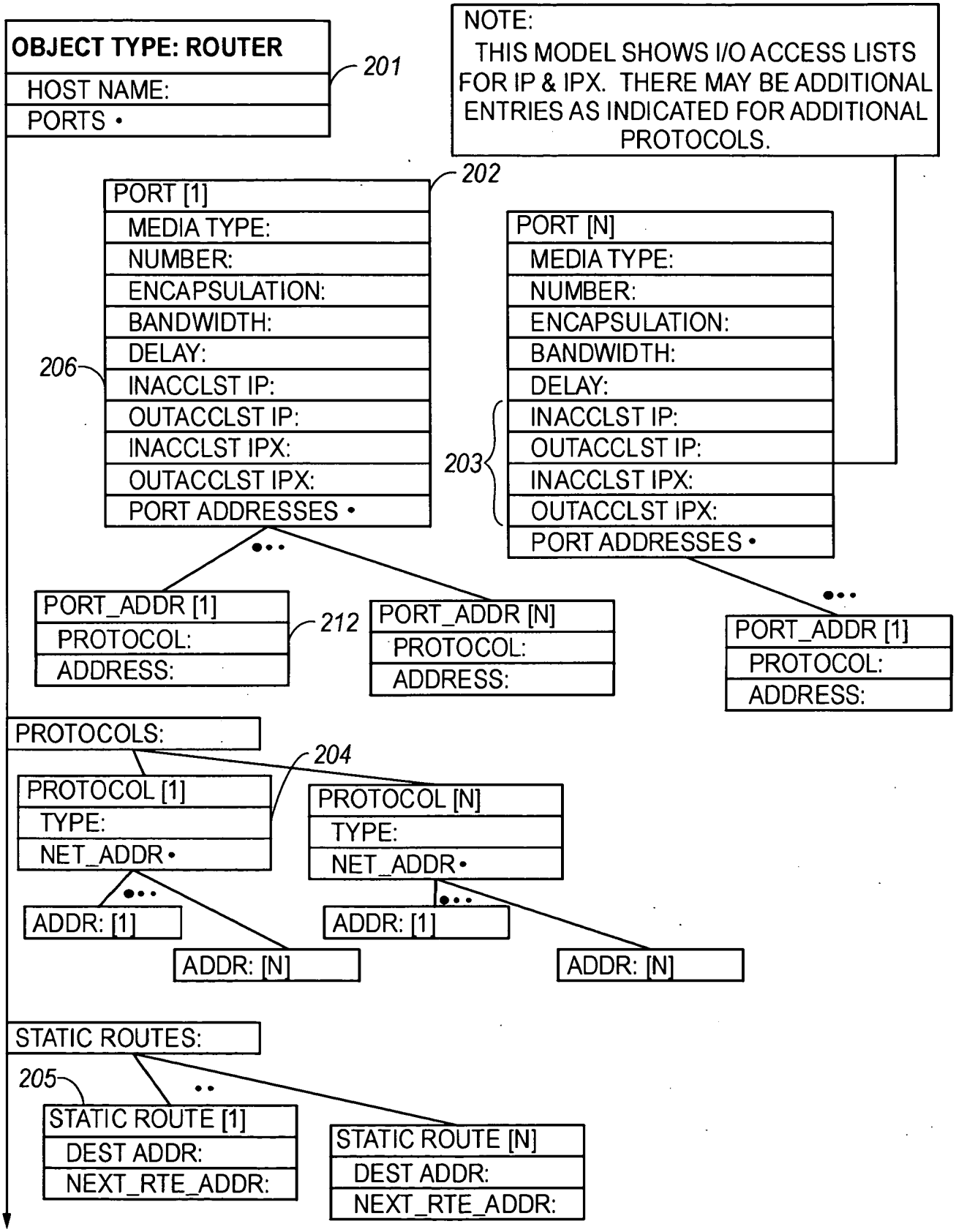

OBJECT TYPE: ROUTER
HOST NAME:
PORTS •
201
NOTE:
THIS MODEL SHOWS I/O ACCESS LISTS FOR IP & IPX. THERE MAY BE ADDITIONAL ENTRIES AS INDICATED FOR ADDITIONAL PROTOCOLS.
202
PORT [1]
MEDIA TYPE:
NUMBER:
ENCAPSULATION:
BANDWIDTH:
DELAY:
206
INACCLST IP:
OUTACCLST IP:
INACCLST IPX:
OUTACCLST IPX:
PORT ADDRESSES •
PORT [N]
MEDIA TYPE:
NUMBER:
ENCAPSULATION:
BANDWIDTH:
DELAY:
203
INACCLST IP:
OUTACCLST IP:
INACCLST IPX:
OUTACCLST IPX:
PORT ADDRESSES •
PORT_ADDR [1]
PROTOCOL:
ADDRESS:
212
PORT_ADDR [N]
PROTOCOL:
ADDRESS:
PORT_ADDR [1]
PROTOCOL:
ADDRESS:
PROTOCOLS:
204
PROTOCOL [1]
TYPE:
NET_ADDR •
PROTOCOL [N]
TYPE:
NET_ADDR •
ADDR: [1]
ADDR: [N]
ADDR: [1]
ADDR: [N]
STATIC ROUTES:
205
STATIC ROUTE [1]
DEST ADDR:
NEXT_RTE_ADDR:
STATIC ROUTE [N]
DEST ADDR:
NEXT_RTE_ADDR:

FIG. 2A

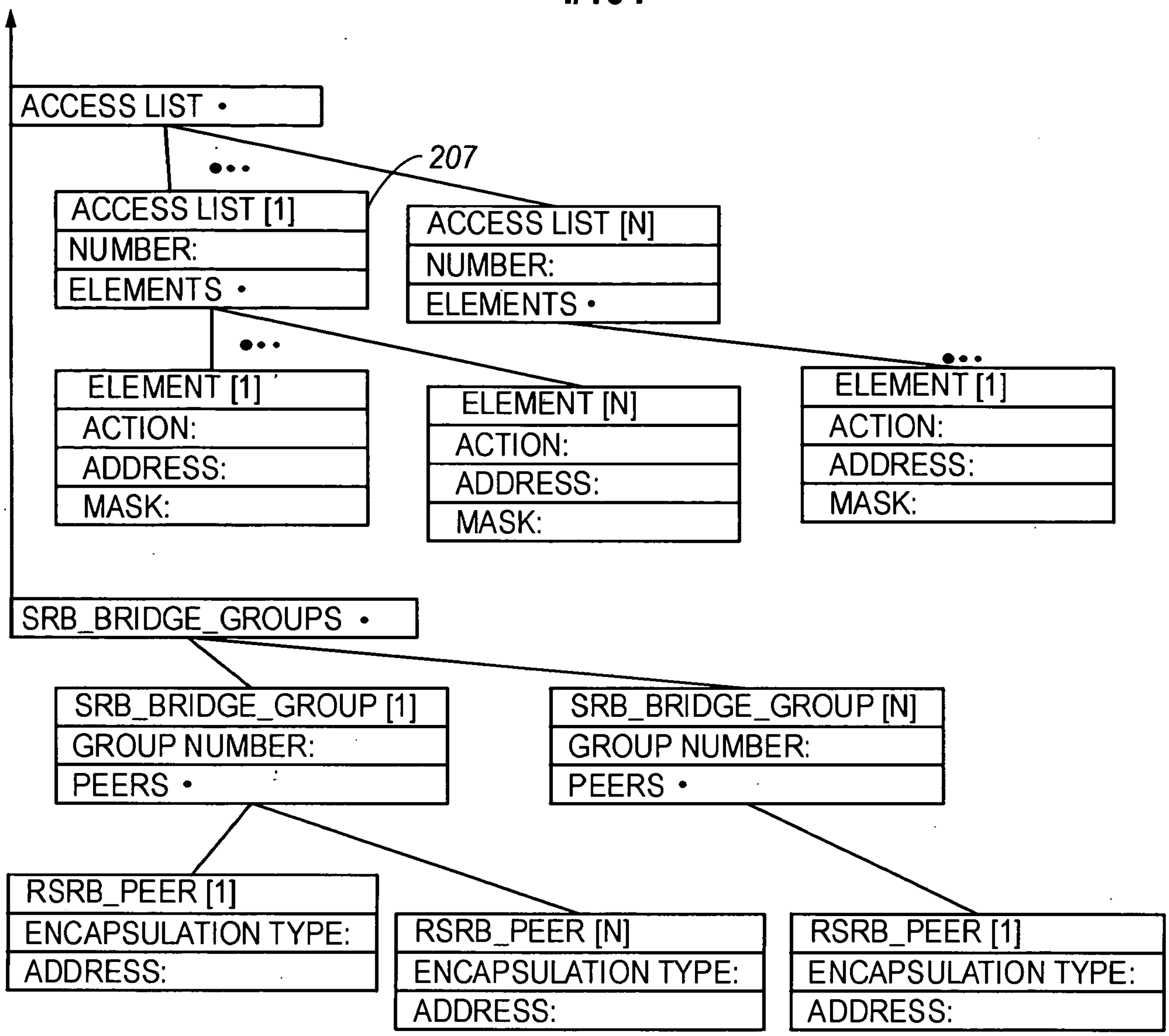


FIG. 2B

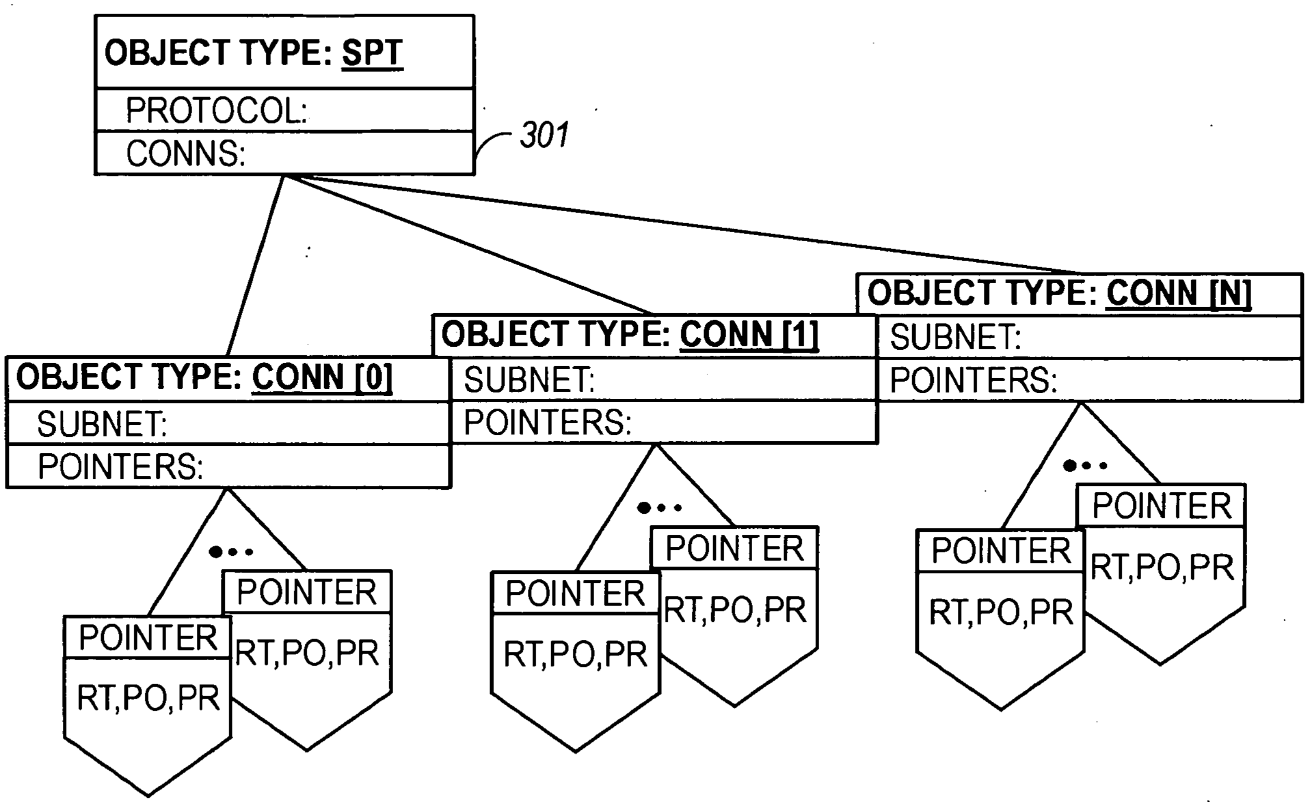
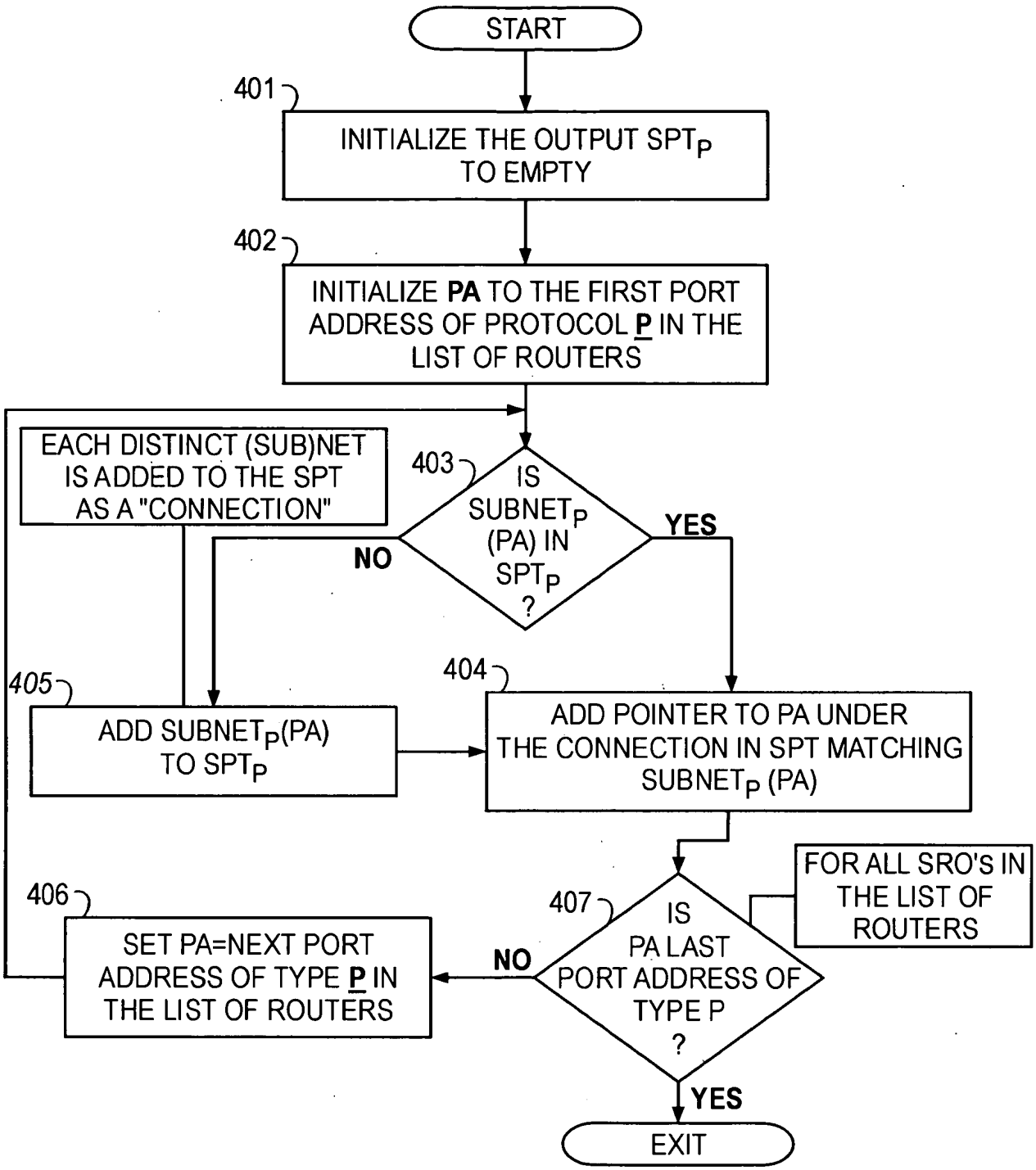


FIG. 3

NOTE:
RT=ROUTER
PO=PORT
PR=PROTOCOL



NOTE- SUBNET FUNCTIONS ARE DETERMINED AS FOLLOWS:

$SUBNET_{IP}([A1\ M1]) = [A1\ \&\ M1)\ M1]$
WHERE "&" IS A BITWISE AND

$SUBNET_{IPX}(NN)=NN$
WHERE NN = IPX SUBNET NUMBER

$SUBNET_{APPLETALK}([CBRLB\ CBRUB]) = [CBRLB\ CBRUB]$
WHERE:CBRLB = CABLE RANGE LOWER BOUNDRY & CBRUB=CABLE RANGE UPPER BOUNDRY

FIG. 4

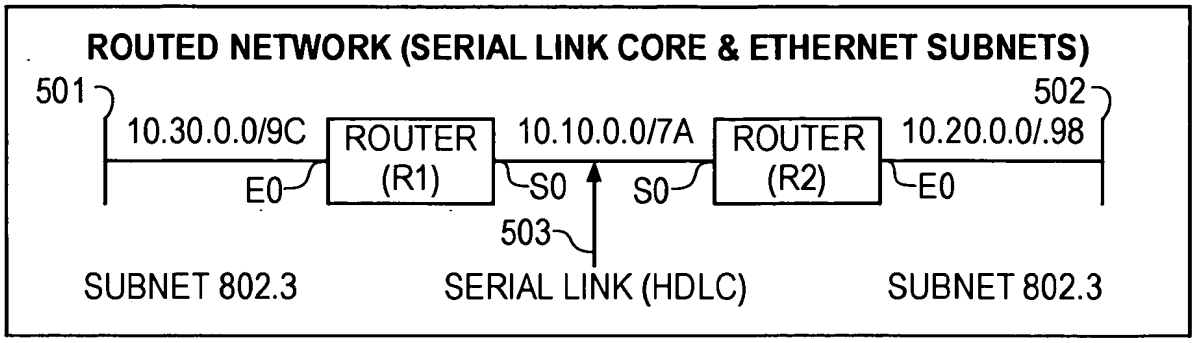


FIG. 5

ROUTER R1:

```
VERSION 10.0
!
HOSTNAME R1
!
NOVELL ROUTING 0000.0C08.94DD
!
INTERFACE ETHERNET0 (602)
IP ADDRESS 10.30.7.2 255.255.0.0
IPX NETWORK 9C
!
INTERFACE SERIAL0 (601)
IP ADDRESS 10.10.4.1 255.255.0.0
IPX NETWORK 7A
BANDWIDTH 1000
!
ROUTER IGRP 109
NETWORK 10.0.0.0
!
```

FIG. 6A

ROUTER R2:

```
VERSION 10.0
!
HOSTNAME R2
!
NOVELL ROUTING 0000.0C04.3A3E
!
INTERFACE ETHERNET0
IP ADDRESS 10.20.5.2 255.255.0.0
IPX NETWORK 98
!
INTERFACE SERIAL0
IP ADDRESS 10.10.4.2 255.255.0.0
IPX NETWORK 7A
!
ROUTER IGRP 109
NETWORK 10.0.0.0
!
! STATIC ROUTE DEFINITION
IP 70.70.3.0 255.255.0.0 199.37.28.3
```

FIG. 6B

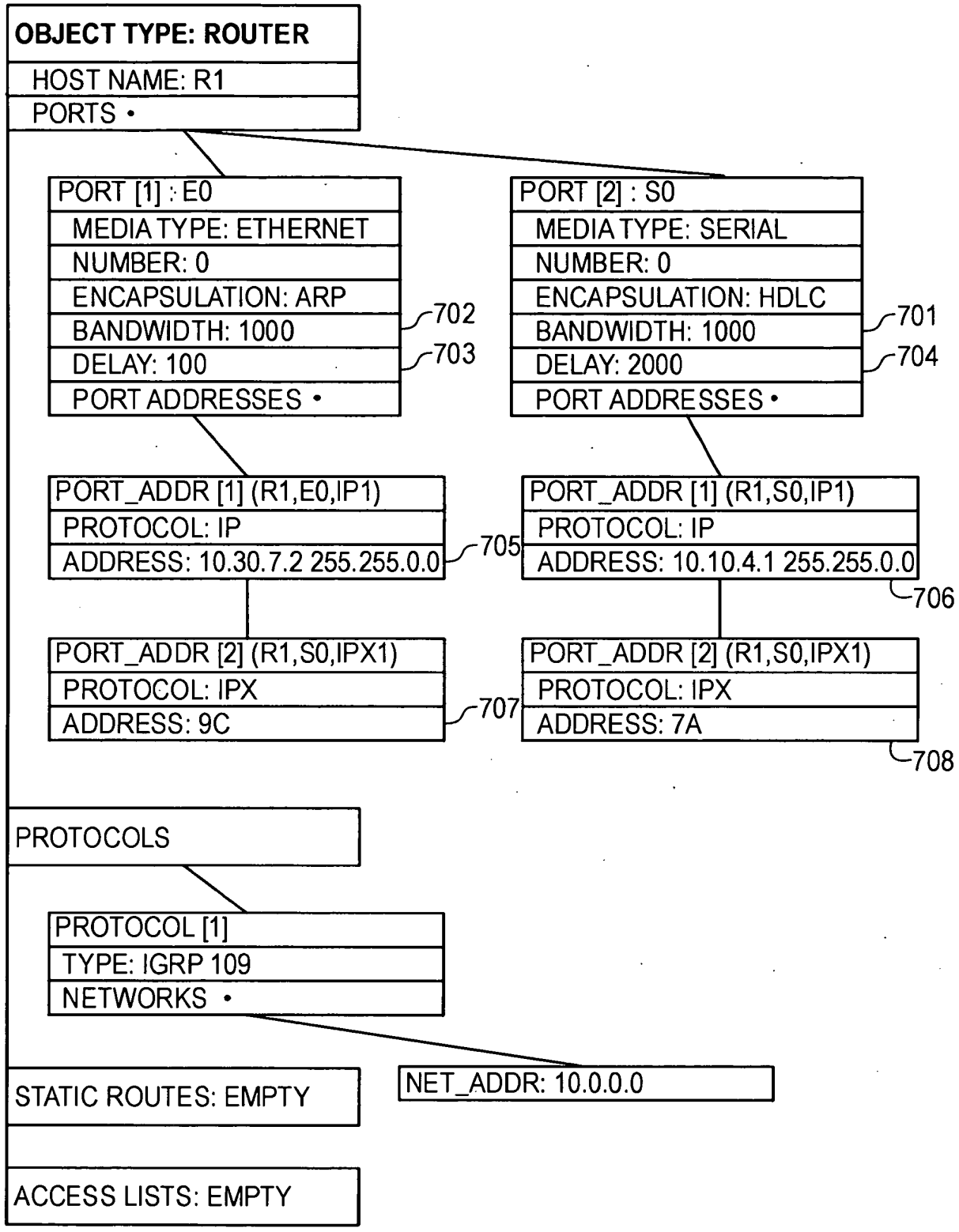

OBJECT TYPE: ROUTER
HOST NAME: R1
PORTS •
PORT [1] : E0
MEDIA TYPE: ETHERNET
NUMBER: 0
ENCAPSULATION: ARP
BANDWIDTH: 1000
DELAY: 100
PORT ADDRESSES •
702
703
PORT [2] : S0
MEDIA TYPE: SERIAL
NUMBER: 0
ENCAPSULATION: HDLC
BANDWIDTH: 1000
DELAY: 2000
PORT ADDRESSES •
701
704
PORT_ADDR [1] (R1,E0,IP1)
PROTOCOL: IP
ADDRESS: 10.30.7.2 255.255.0.0
705
PORT_ADDR [1] (R1,S0,IP1)
PROTOCOL: IP
ADDRESS: 10.10.4.1 255.255.0.0
706
PORT_ADDR [2] (R1,S0,IPX1)
PROTOCOL: IPX
ADDRESS: 9C
707
PORT_ADDR [2] (R1,S0,IPX1)
PROTOCOL: IPX
ADDRESS: 7A
708
PROTOCOLS
PROTOCOL [1]
TYPE: IGRP 109
NETWORKS •
NET_ADDR: 10.0.0.0
STATIC ROUTES: EMPTY
ACCESS LISTS: EMPTY

FIG. 7A

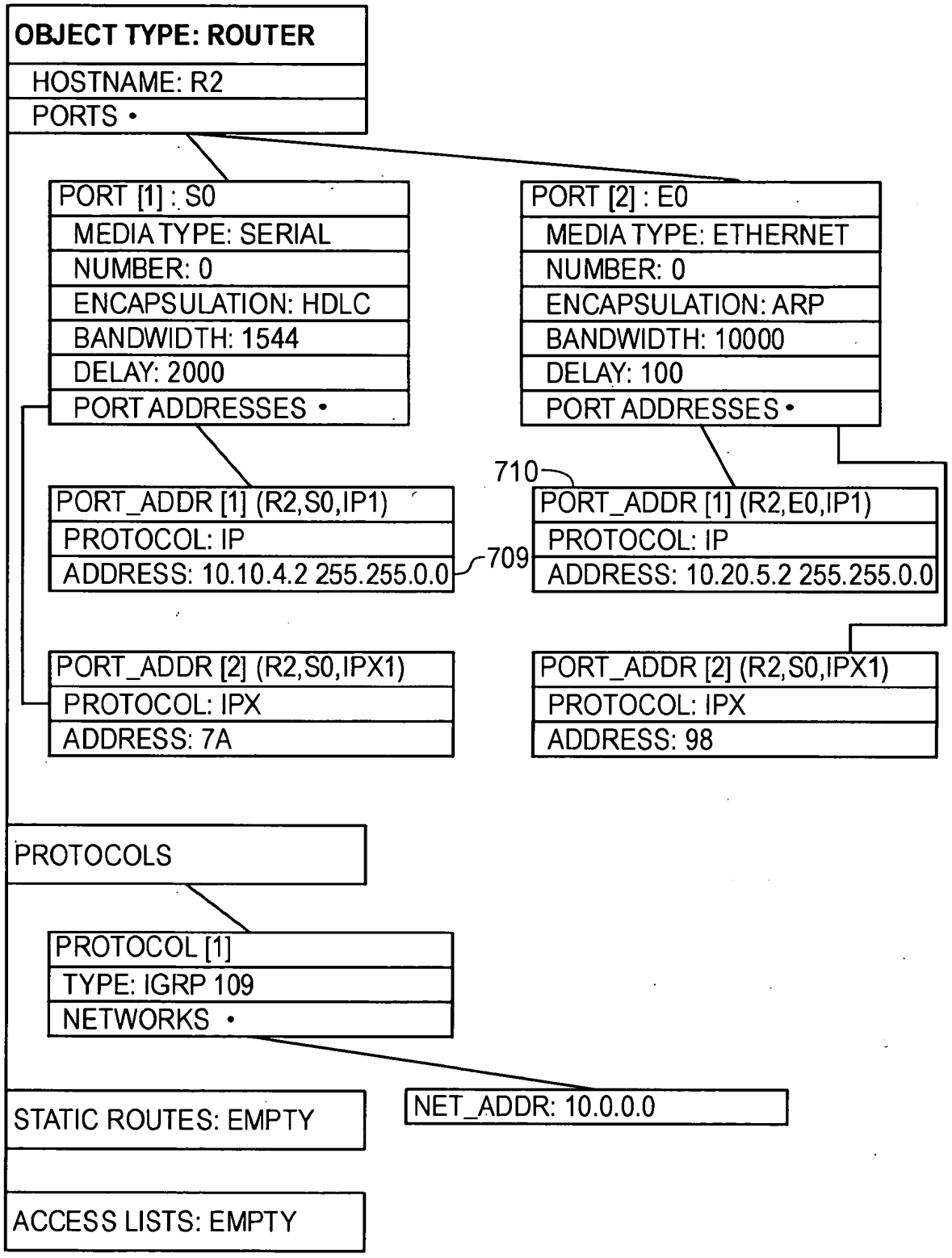

OBJECT TYPE: ROUTER
HOSTNAME: R2
PORTS •
PORT [1] : S0
MEDIA TYPE: SERIAL
NUMBER: 0
ENCAPSULATION: HDLC
BANDWIDTH: 1544
DELAY: 2000
PORT ADDRESSES •
PORT [2] : E0
MEDIA TYPE: ETHERNET
NUMBER: 0
ENCAPSULATION: ARP
BANDWIDTH: 10000
DELAY: 100
PORT ADDRESSES •
710
PORT_ADDR [1] (R2,S0,IP1)
PROTOCOL: IP
ADDRESS: 10.10.4.2 255.255.0.0
709
PORT_ADDR [1] (R2,E0,IP1)
PROTOCOL: IP
ADDRESS: 10.20.5.2 255.255.0.0
PORT_ADDR [2] (R2,S0,IPX1)
PROTOCOL: IPX
ADDRESS: 7A
PORT_ADDR [2] (R2,S0,IPX1)
PROTOCOL: IPX
ADDRESS: 98
PROTOCOLS
PROTOCOL [1]
TYPE: IGRP 109
NETWORKS •
NET_ADDR: 10.0.0.0
STATIC ROUTES: EMPTY
ACCESS LISTS: EMPTY

FIG. 7B

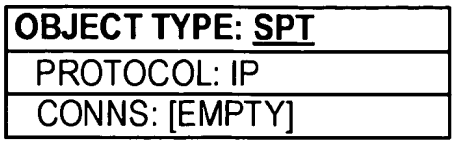


FIG. 8A

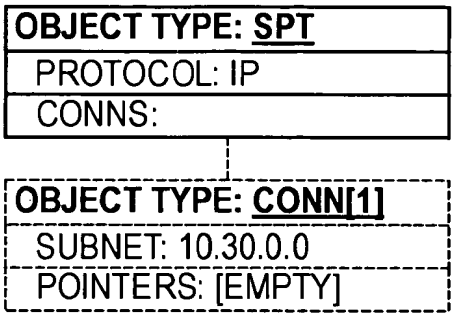


FIG. 8B

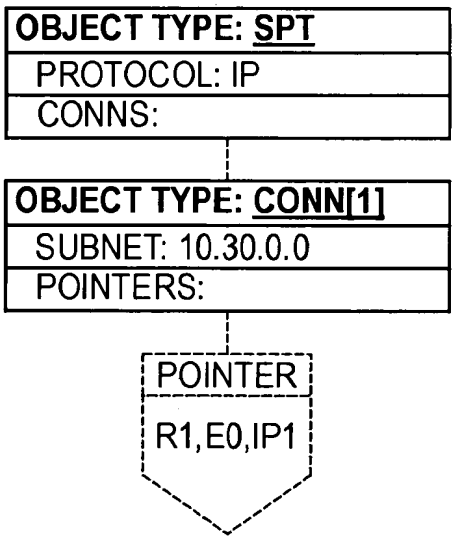
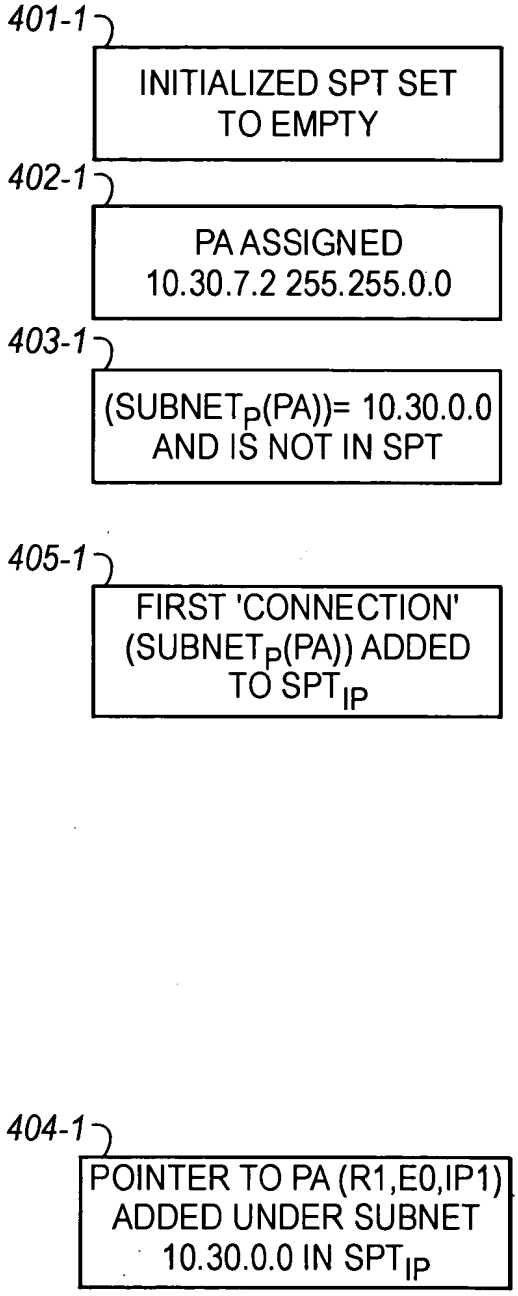


FIG. 8C



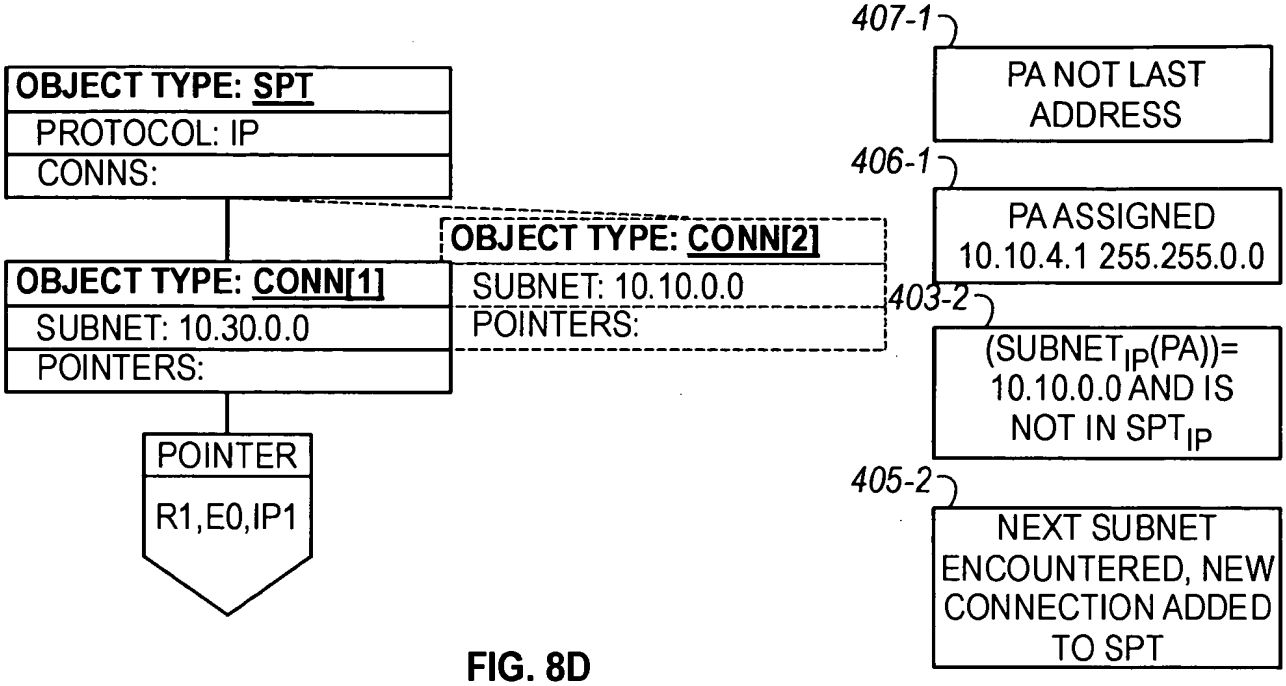


FIG. 8D

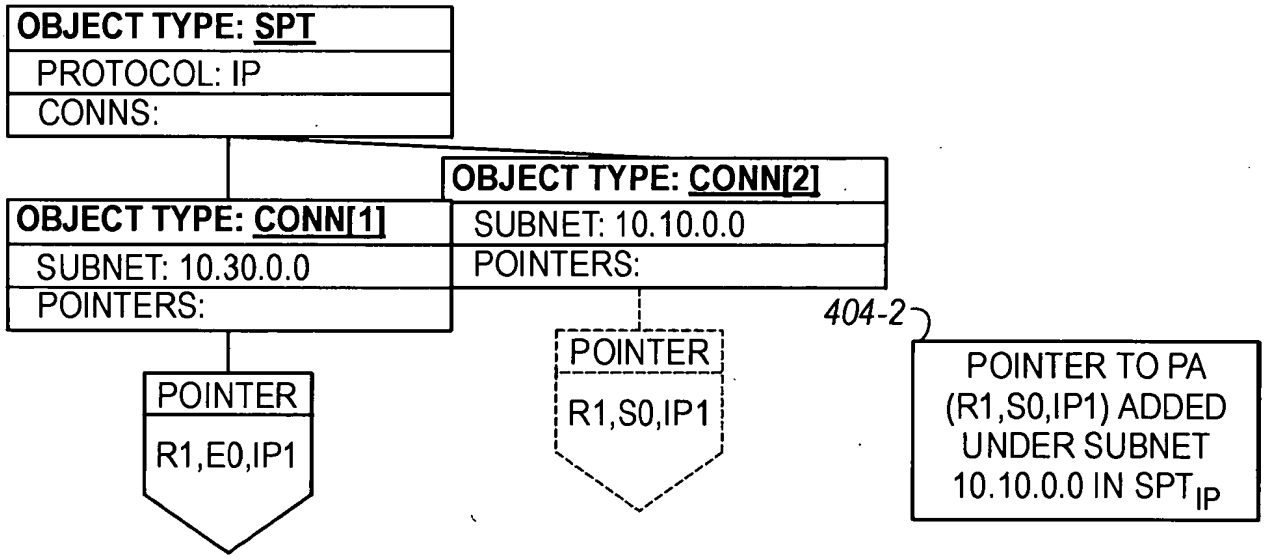


FIG. 8E

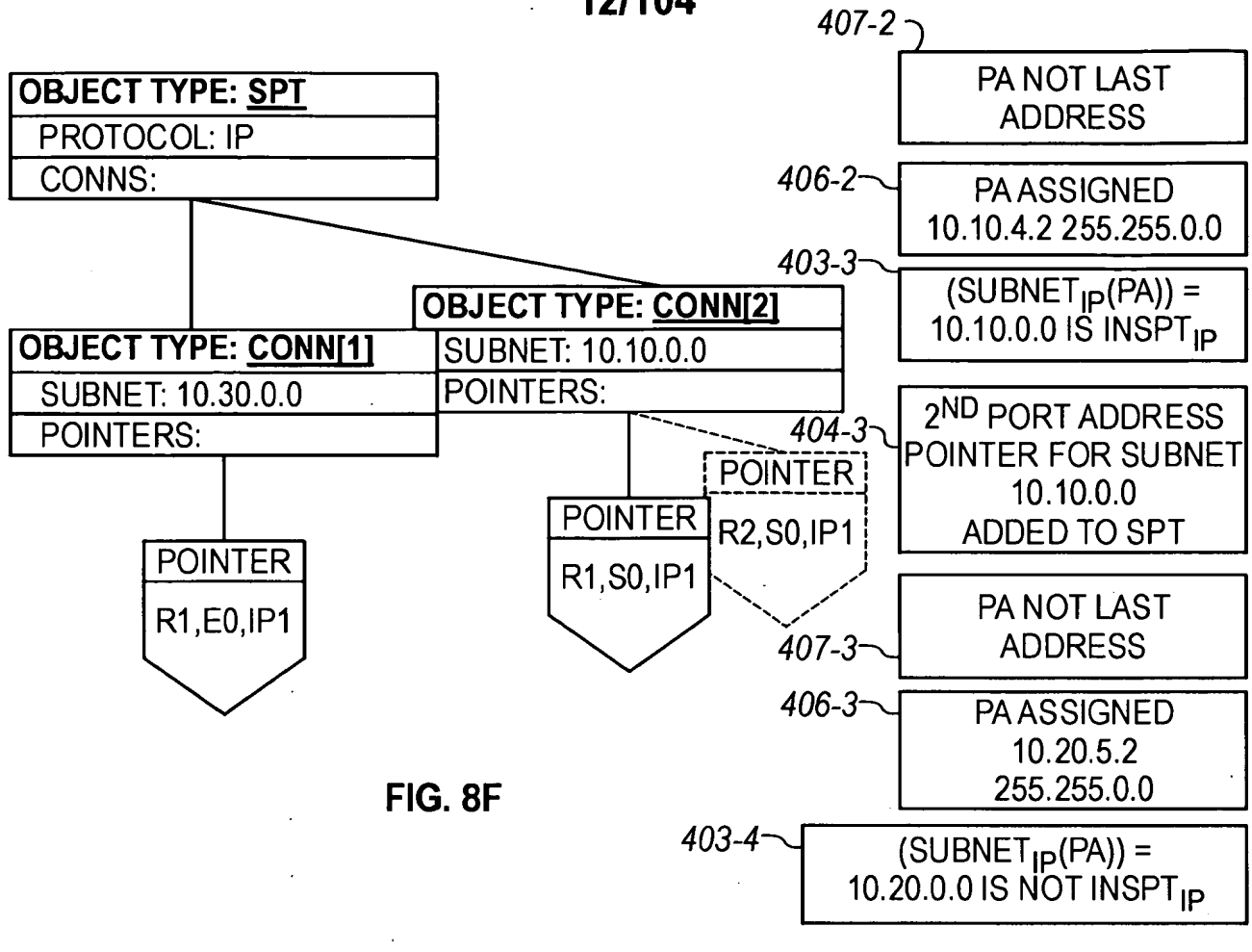


FIG. 8F

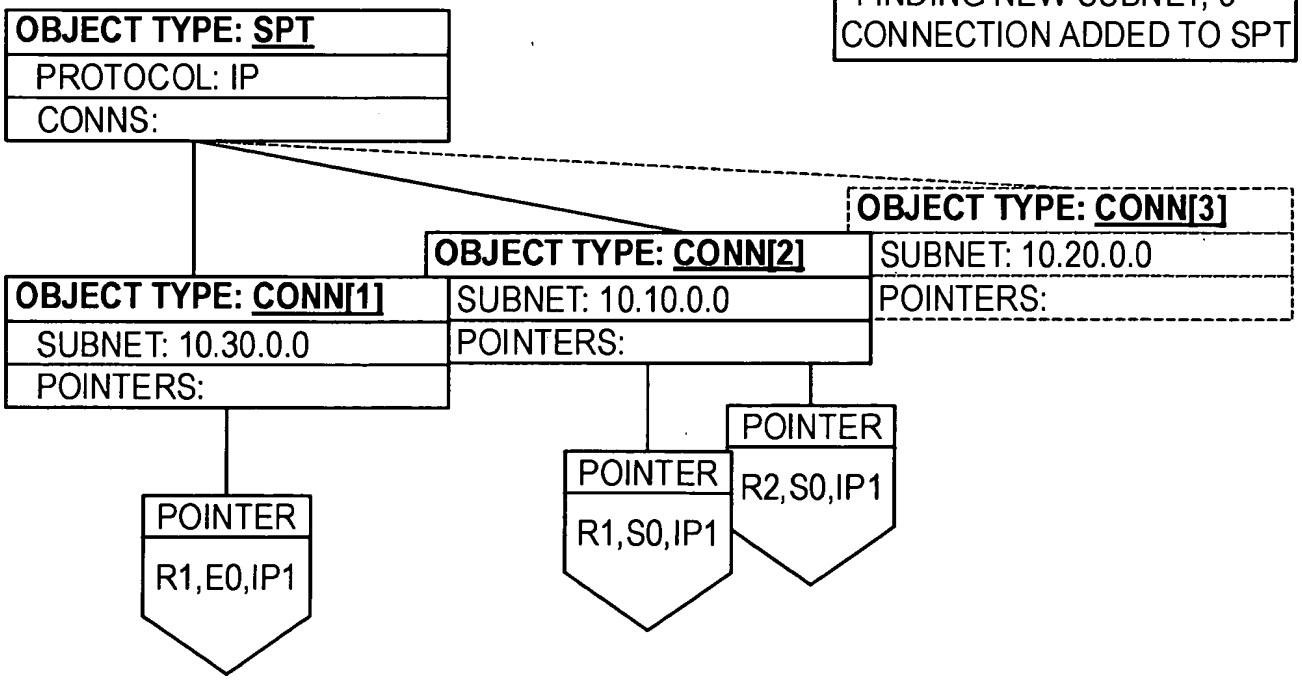


FIG. 8G

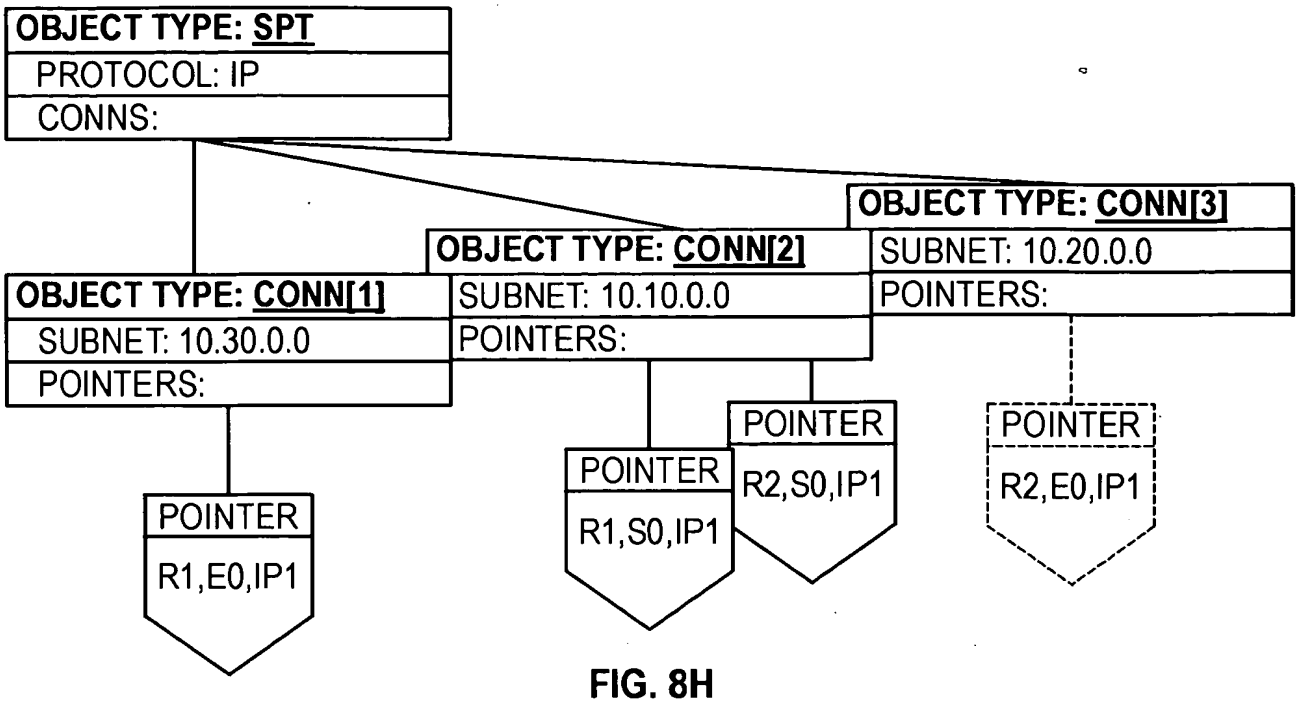


FIG. 8H

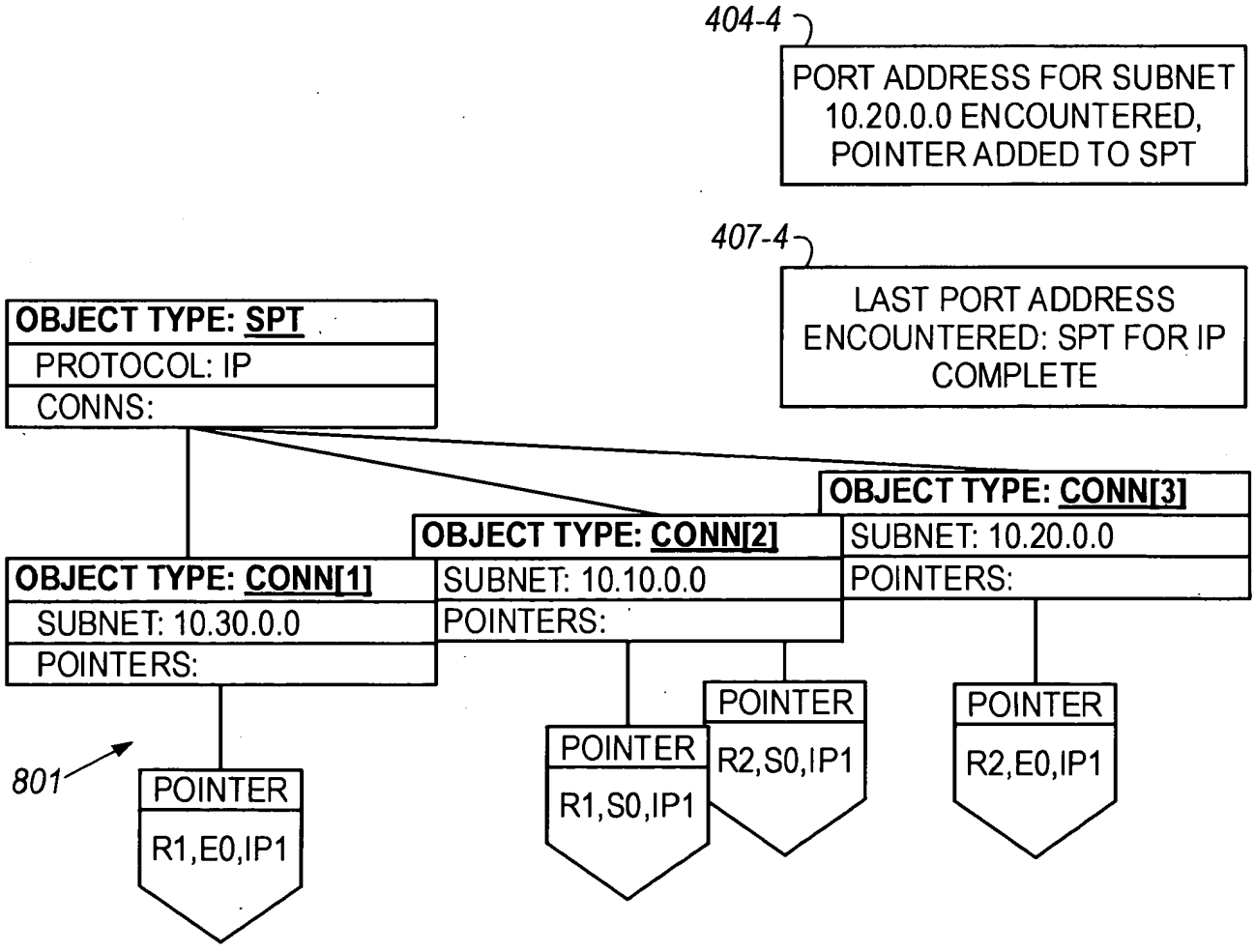


FIG. 8I

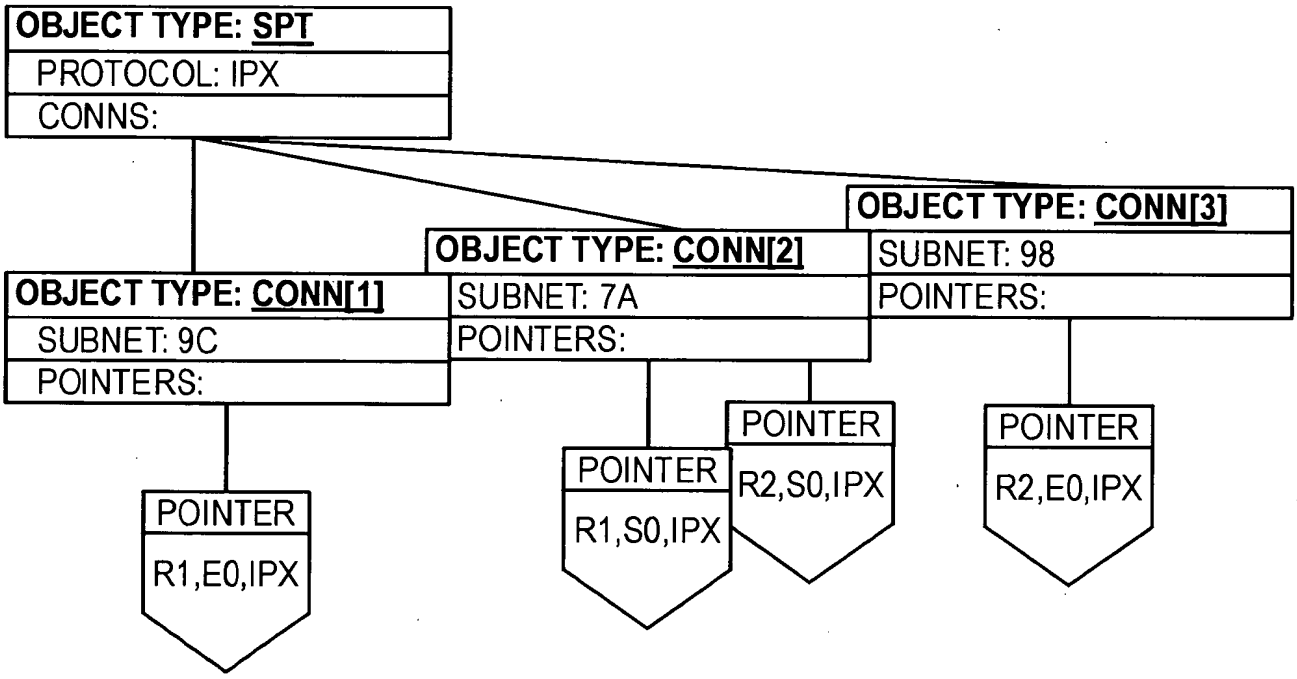

OBJECT TYPE: SPT
PROTOCOL: IPX
CONNS:
OBJECT TYPE: CONN[1]
SUBNET: 9C
POINTERS:
OBJECT TYPE: CONN[2]
SUBNET: 7A
POINTERS:
OBJECT TYPE: CONN[3]
SUBNET: 98
POINTERS:
POINTER
R1,E0,IPX
POINTER
R1,S0,IPX
POINTER
R2,S0,IPX
POINTER
R2,E0,IPX

FIG. 8J

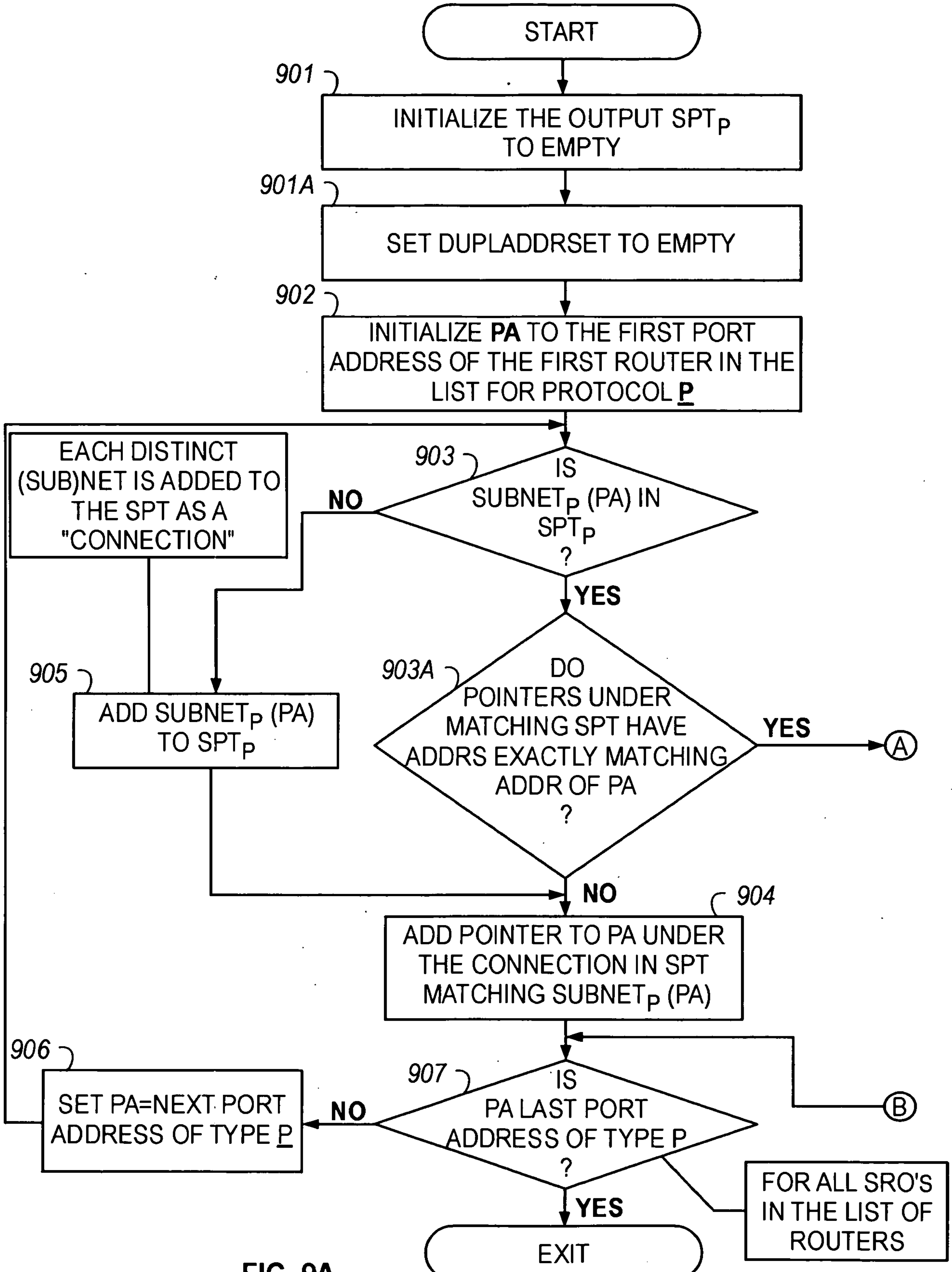


FIG. 9A

NOTE
AS REFERRED TO IN THIS FLOWCHART THE TERM "DUPLADDRSET" CONNOTES A SET OF PORT ADDRESS SETS THAT CAPTURE THE PORT ADDRESSES THAT EXACTLY MATCH.
FOR EXAMPLE { {PA1, PA3, PA4} {PA9, PA7}} MEANS
PA1, PA3, & PA4 ALL REFER TO THE EXACT SAME ADDRESS
AND PA9 & PA7 REFER TO EXACTLY THE SAME ADDRESS

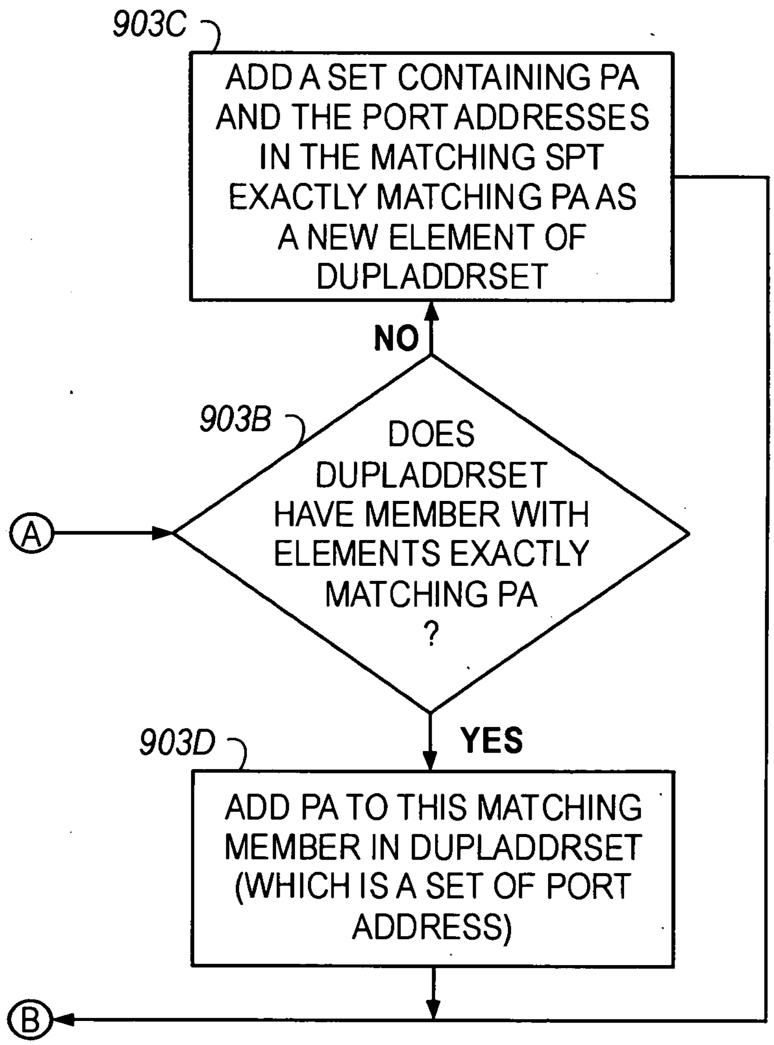


FIG. 9B

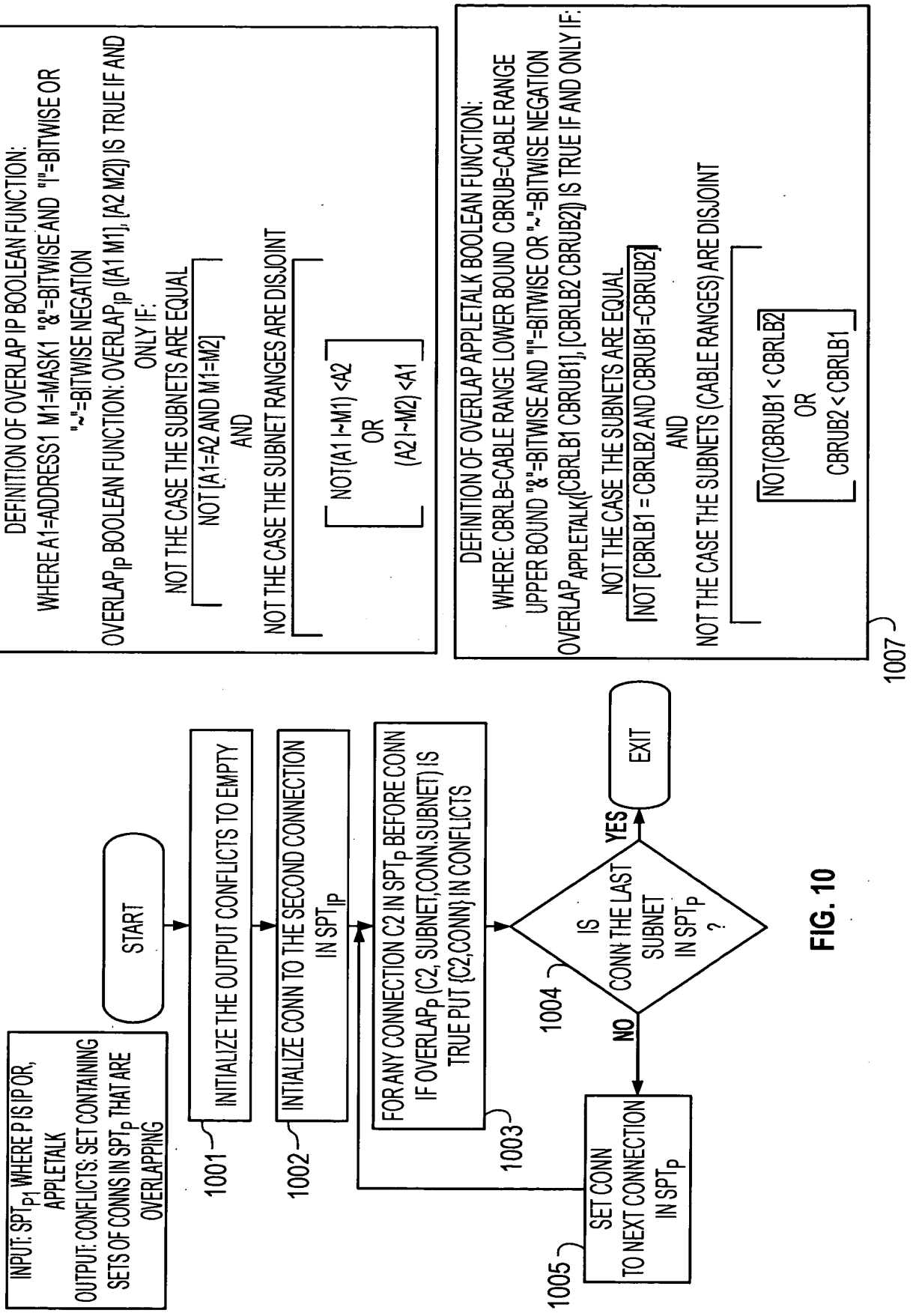

INPUT: SPT_{P1} WHERE P IS IP OR, APPLETALK
OUTPUT: CONFLICTS: SET CONTAINING SETS OF CONNS IN SPT_P THAT ARE OVERLAPPING
START
1001
INITIALIZE THE OUTPUT CONFLICTS TO EMPTY
1002
INTIALIZE CONN TO THE SECOND CONNECTION IN SPT_{IP}
1003
FOR ANY CONNECTION C2 IN SPT_P BEFORE CONN IF $OVERLAP_P$ (C2, SUBNET,CONN.SUBNET) IS TRUE PUT {C2,CONN} IN CONFLICTS
1004
IS CONN THE LAST SUBNET IN SPT_P ?
YES
EXIT
NO
1005
SET CONN TO NEXT CONNECTION IN SPT_P
1006
DEFINITION OF OVERLAP IP BOOLEAN FUNCTION:
WHERE A1=ADDRESS1 M1=MASK1 "&"=BITWISE AND "|"=BITWISE OR "~"=BITWISE NEGATION
$OVERLAP_{IP}$ BOOLEAN FUNCTION: $OVERLAP_{IP}$ ([A1 M1], [A2 M2]) IS TRUE IF AND ONLY IF:
NOT THE CASE THE SUBNETS ARE EQUAL
NOT [A1=A2 AND M1=M2]
AND
NOT THE CASE THE SUBNET RANGES ARE DISJOINT
NOT(A1 |~M1) <A2
OR
(A2 |~M2) <A1
1007
DEFINITION OF OVERLAP APPLETALK BOOLEAN FUNCTION:
WHERE: CBRLB=CABLE RANGE LOWER BOUND CBRUB=CABLE RANGE UPPER BOUND "&"=BITWISE AND "|"=BITWISE OR "~"=BITWISE NEGATION
$OVERLAP_{APPLETALK}$([CBRLB1 CBRUB1], [CBRLB2 CBRUB2]) IS TRUE IF AND ONLY IF:
NOT THE CASE THE SUBNETS ARE EQUAL
NOT [CBRLB1 = CBRLB2 AND CBRUB1=CBRUB2]
AND
NOT THE CASE THE SUBNETS (CABLE RANGES) ARE DISJOINT
NOT(CBRUB1 < CBRLB2
OR
CBRUB2 < CBRLB1

FIG. 10

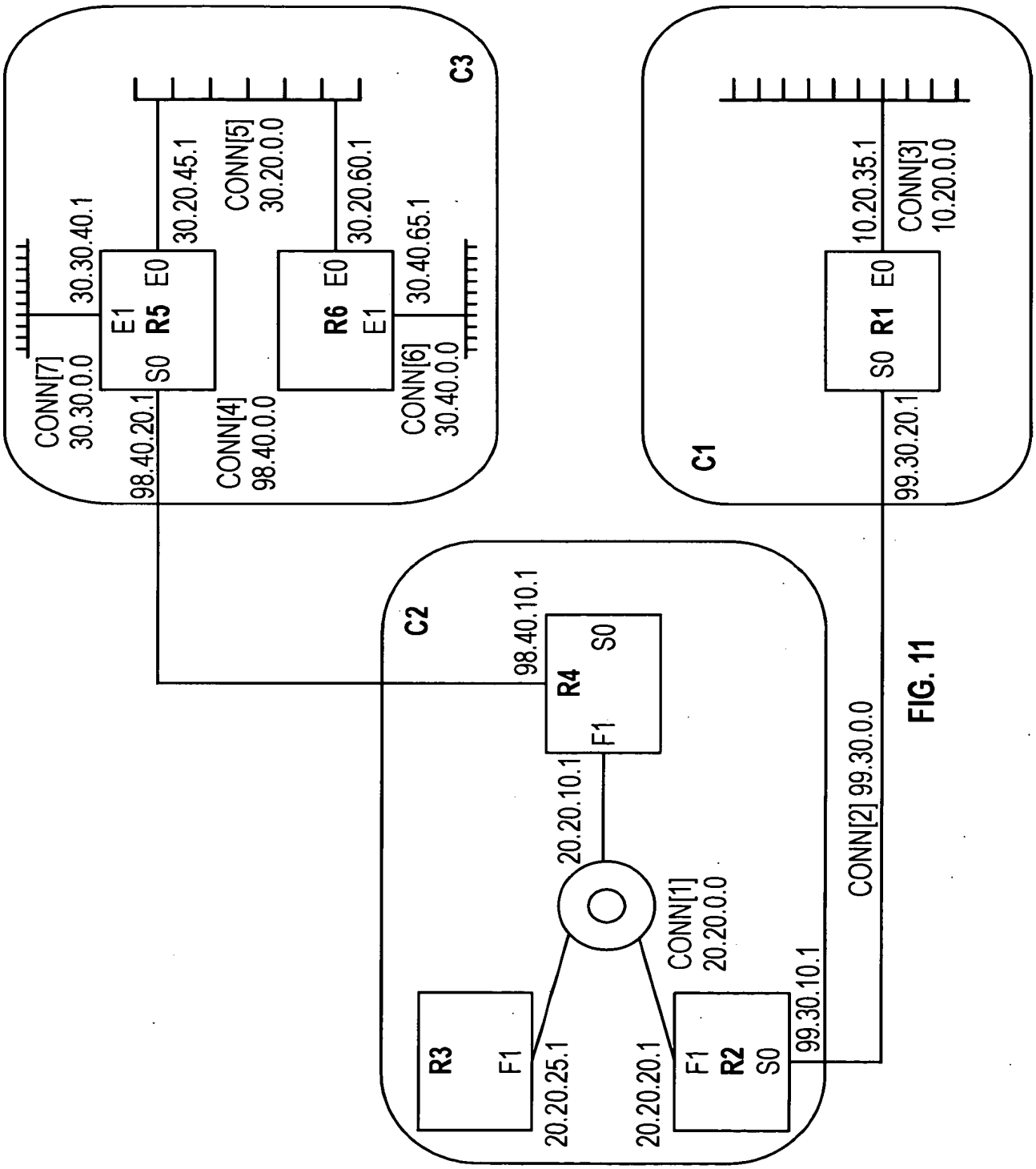


FIG. 11

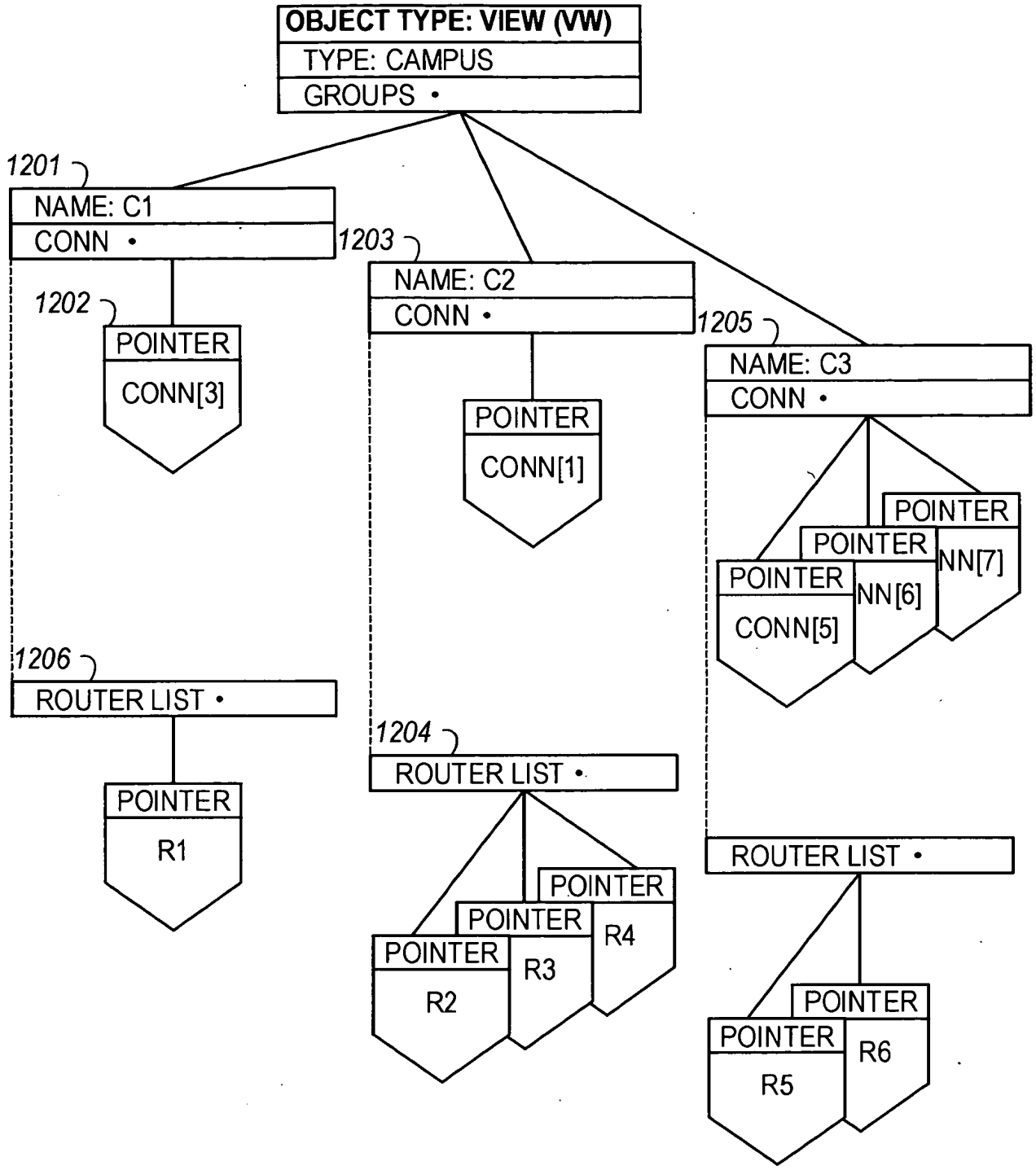


FIG. 12

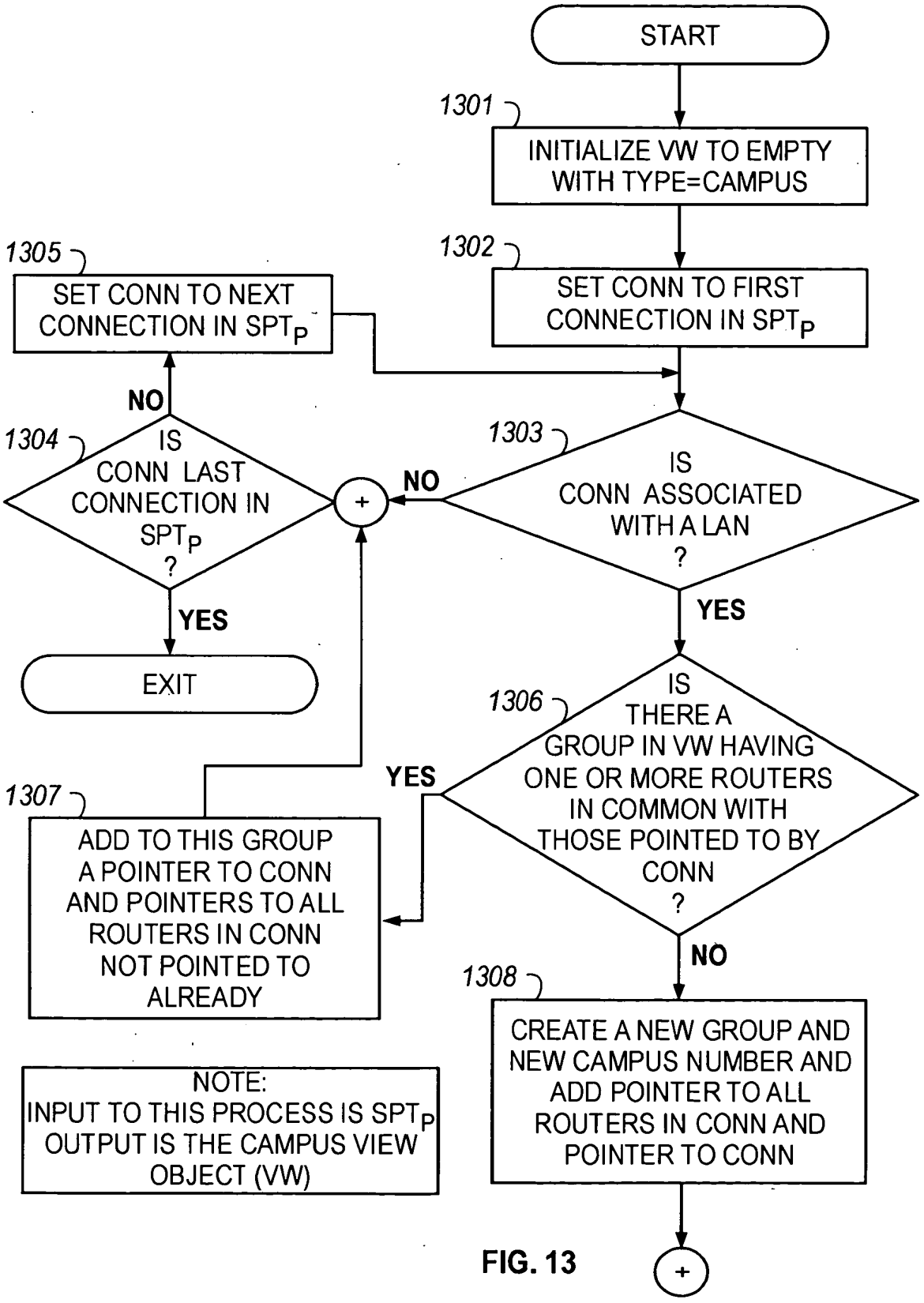


FIG. 13

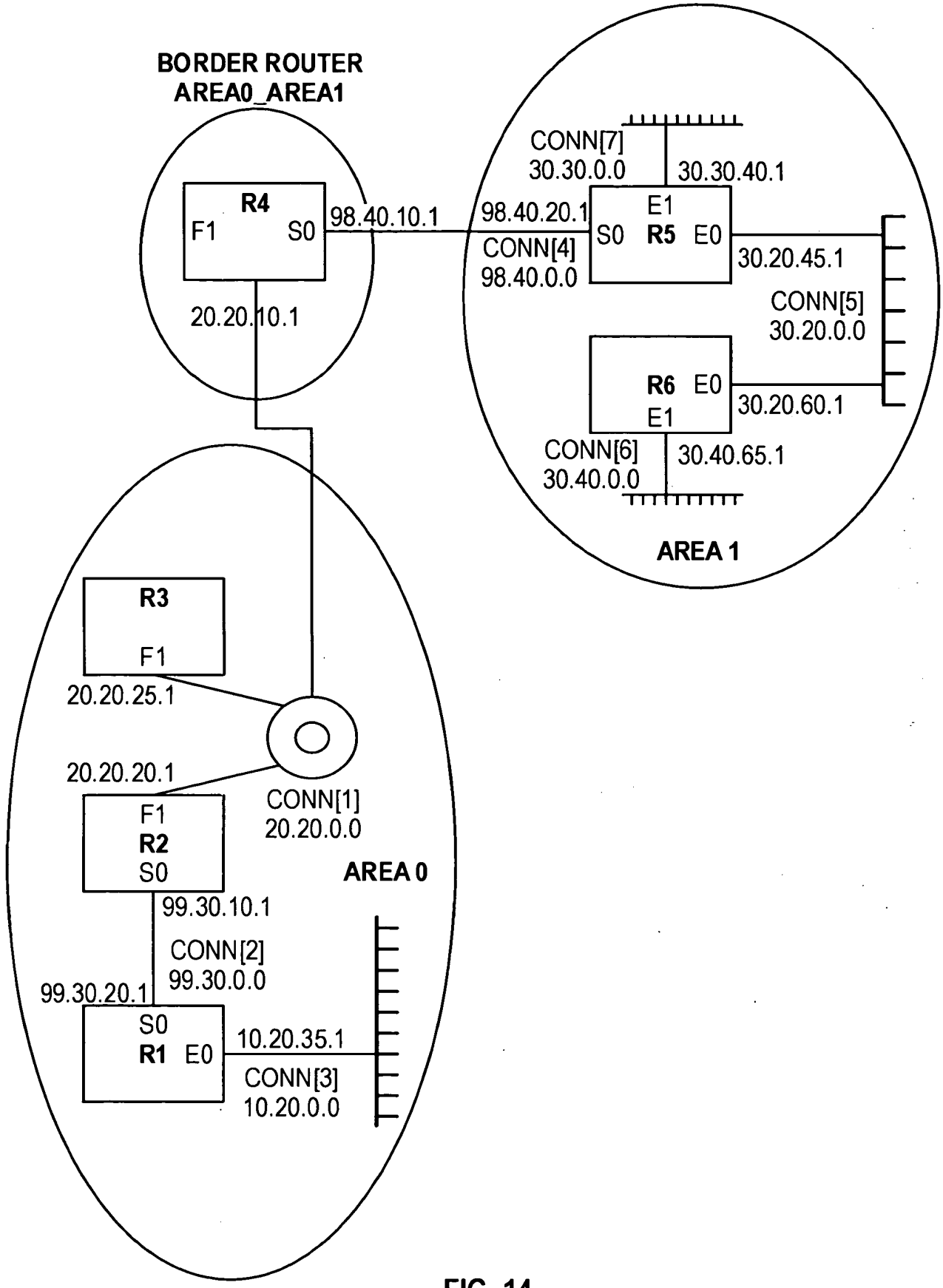


FIG. 14

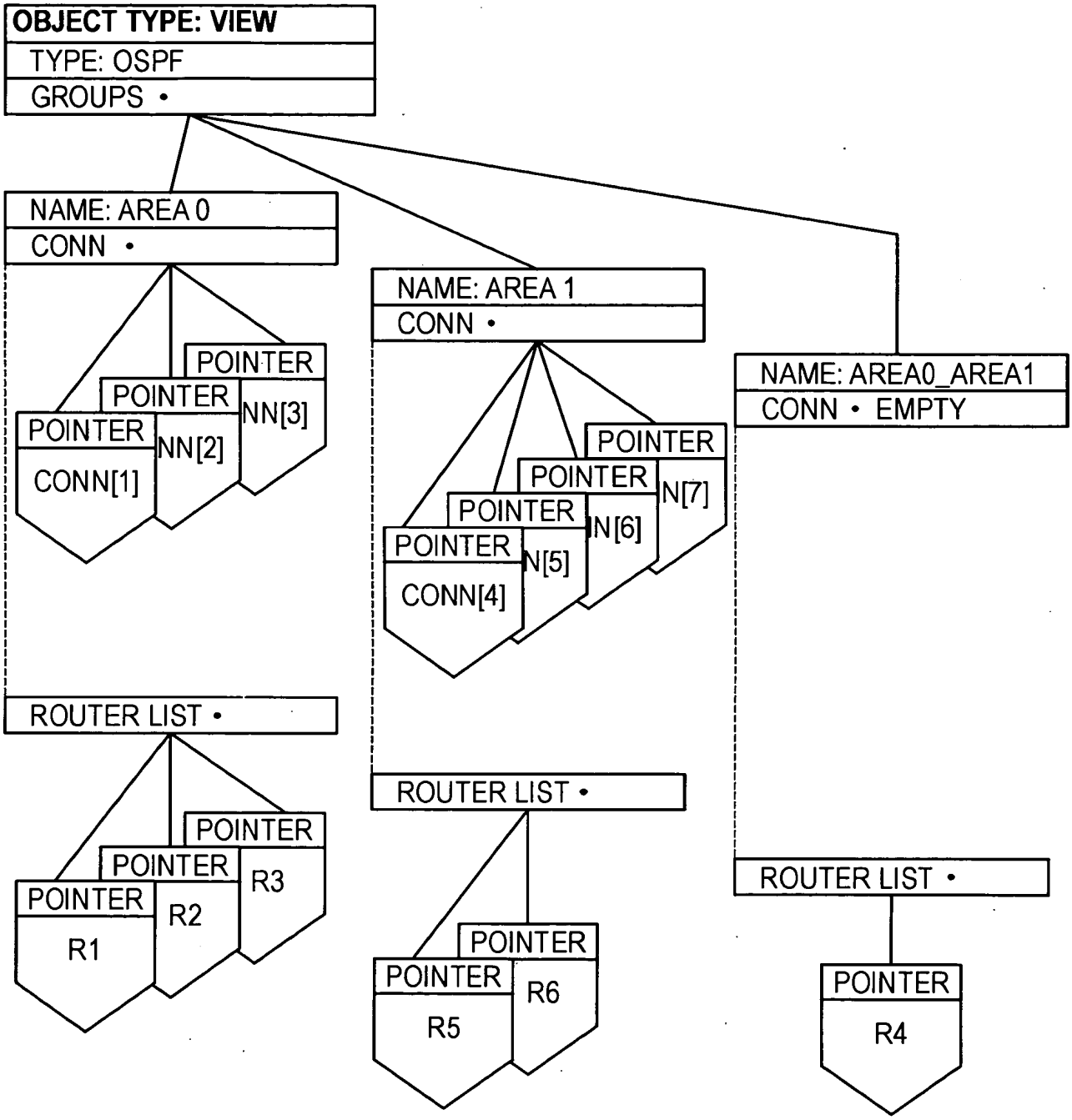


FIG. 15

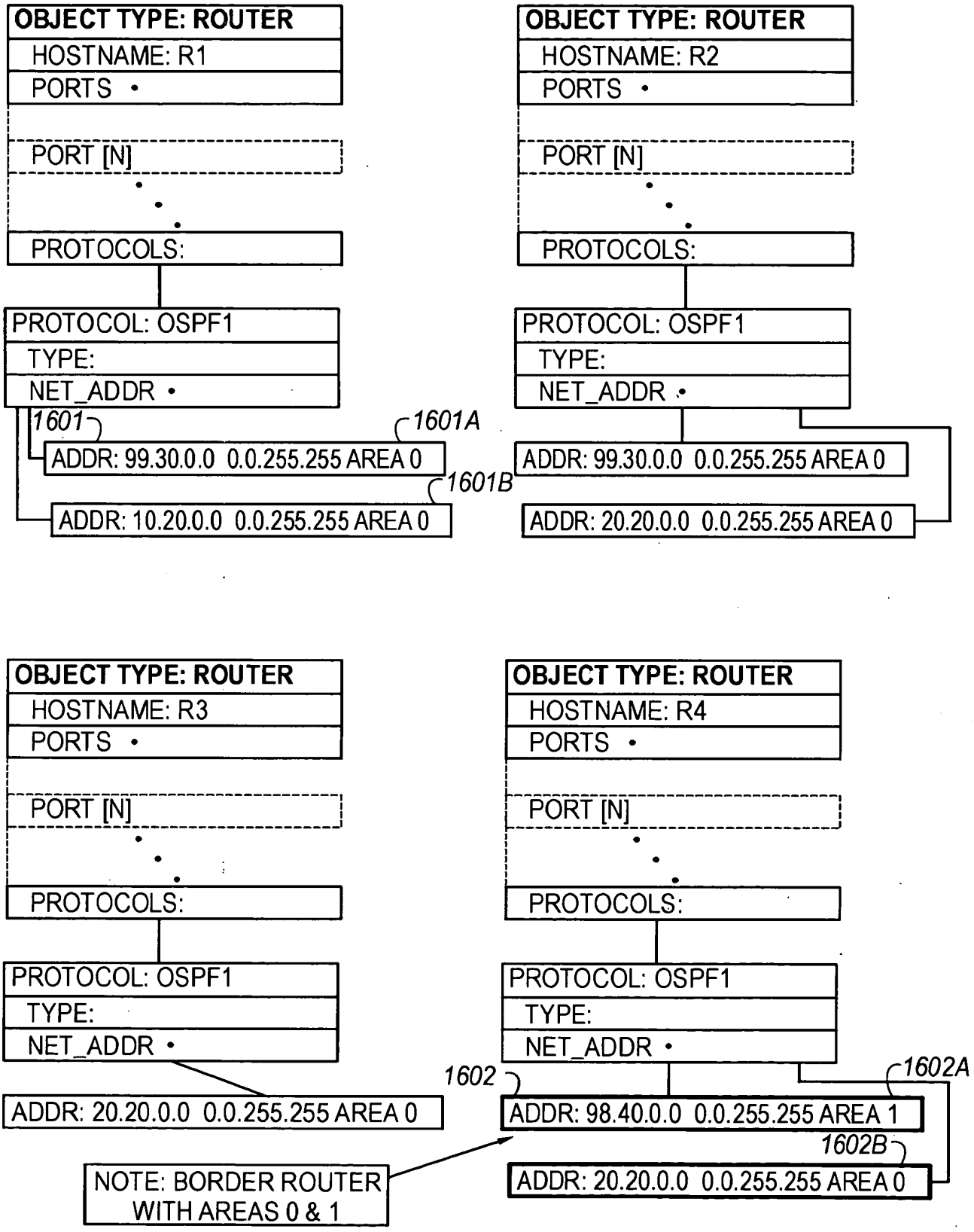


FIG. 16A

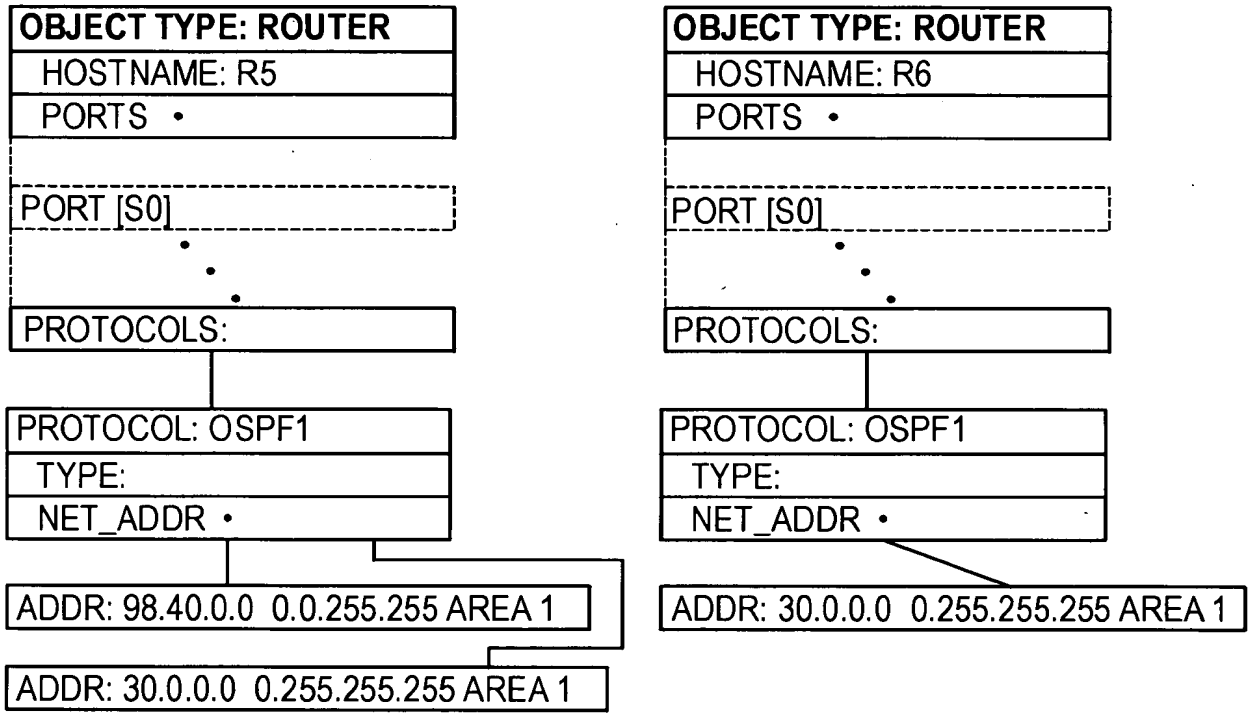

OBJECT TYPE: ROUTER
HOSTNAME: R5
PORTS •
PORT [S0]
PROTOCOLS:
PROTOCOL: OSPF1
TYPE:
NET_ADDR •
ADDR: 98.40.0.0 0.0.255.255 AREA 1
ADDR: 30.0.0.0 0.255.255.255 AREA 1
OBJECT TYPE: ROUTER
HOSTNAME: R6
PORTS •
PORT [S0]
PROTOCOLS:
PROTOCOL: OSPF1
TYPE:
NET_ADDR •
ADDR: 30.0.0.0 0.255.255.255 AREA 1

FIG. 16B

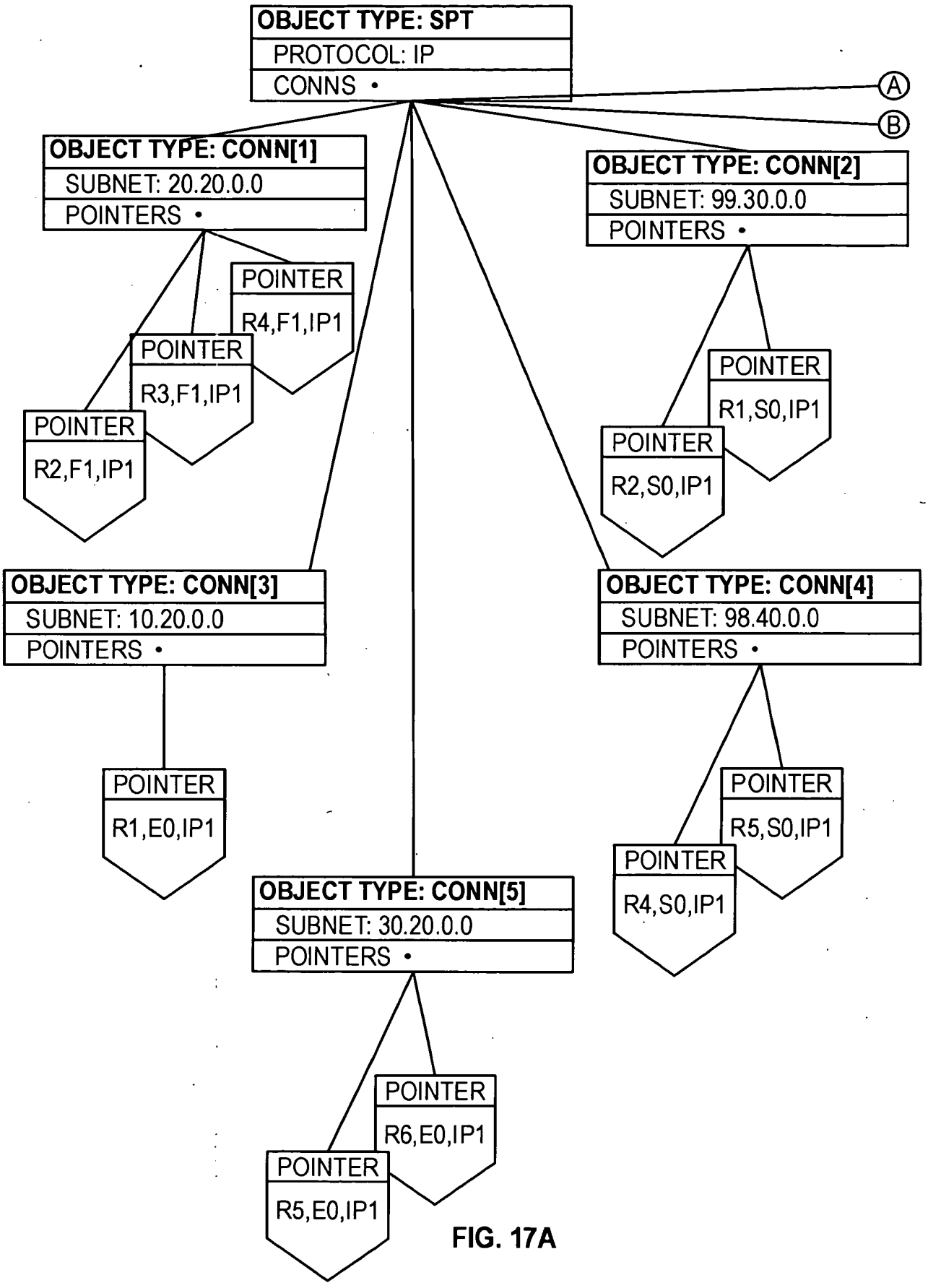


FIG. 17A

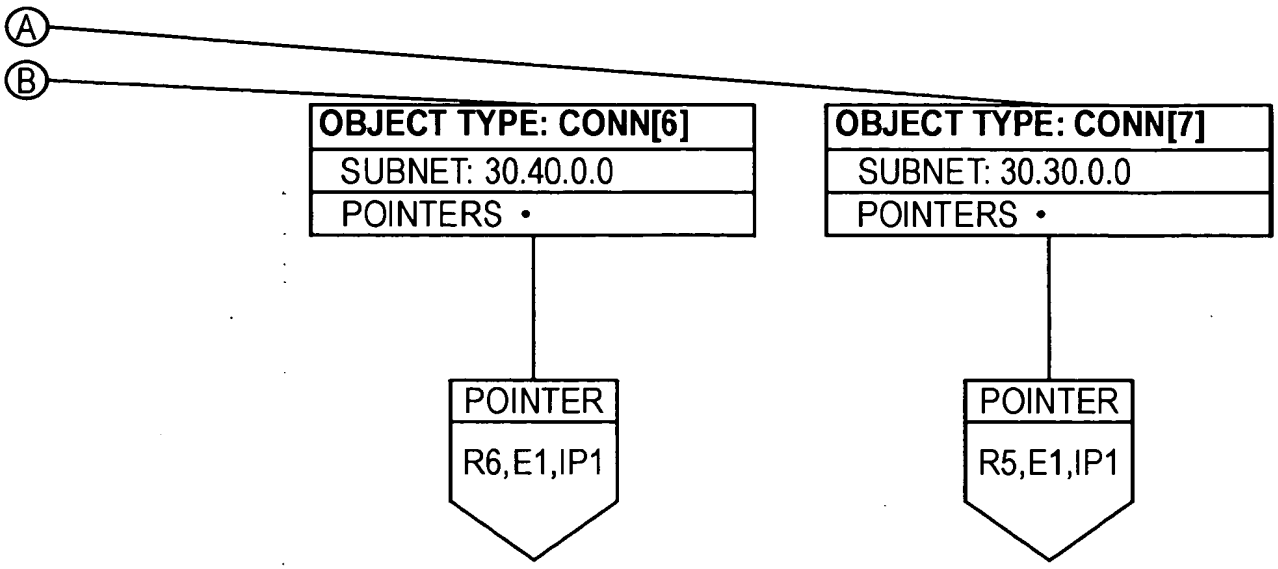


FIG. 17B

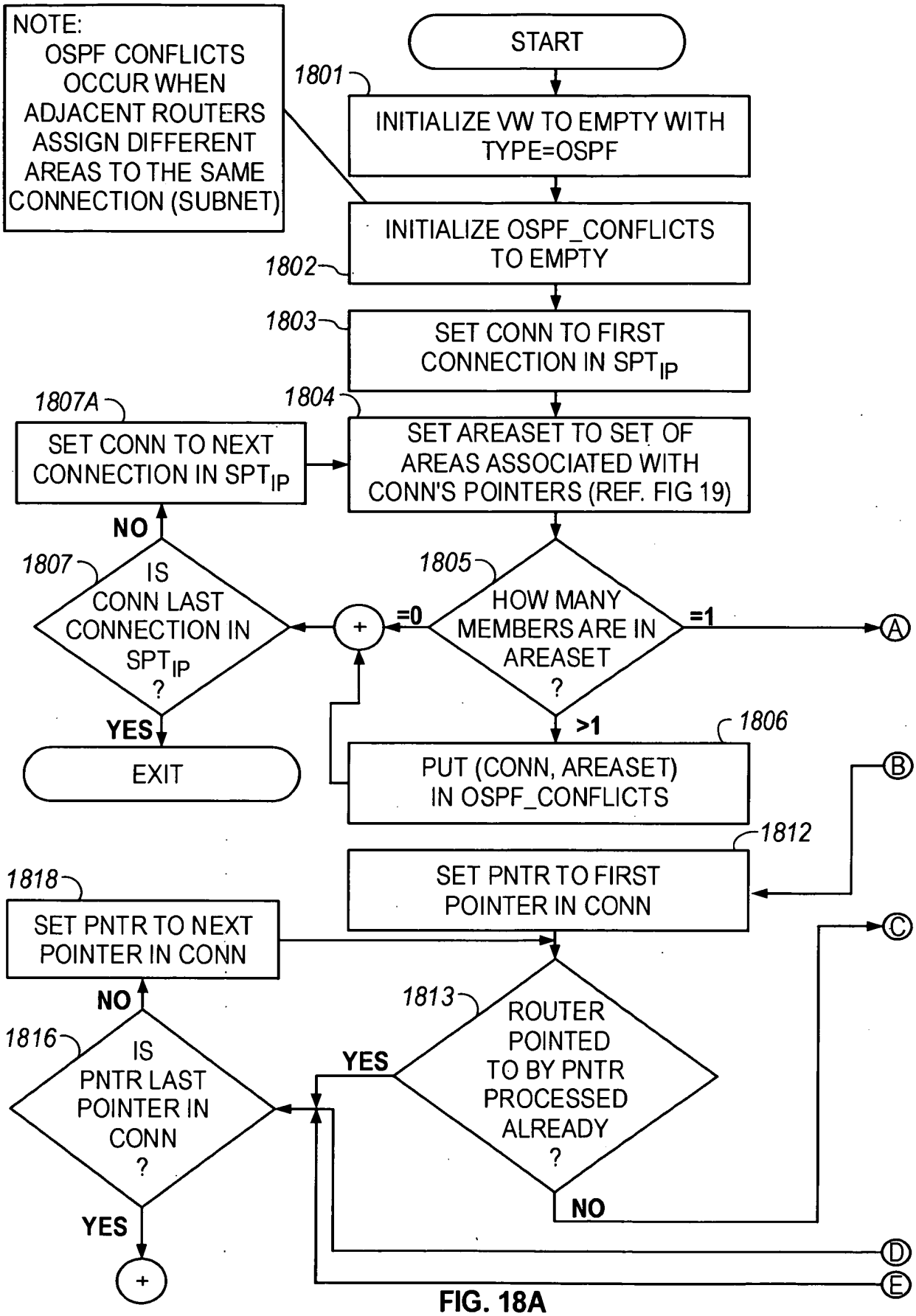


FIG. 18A

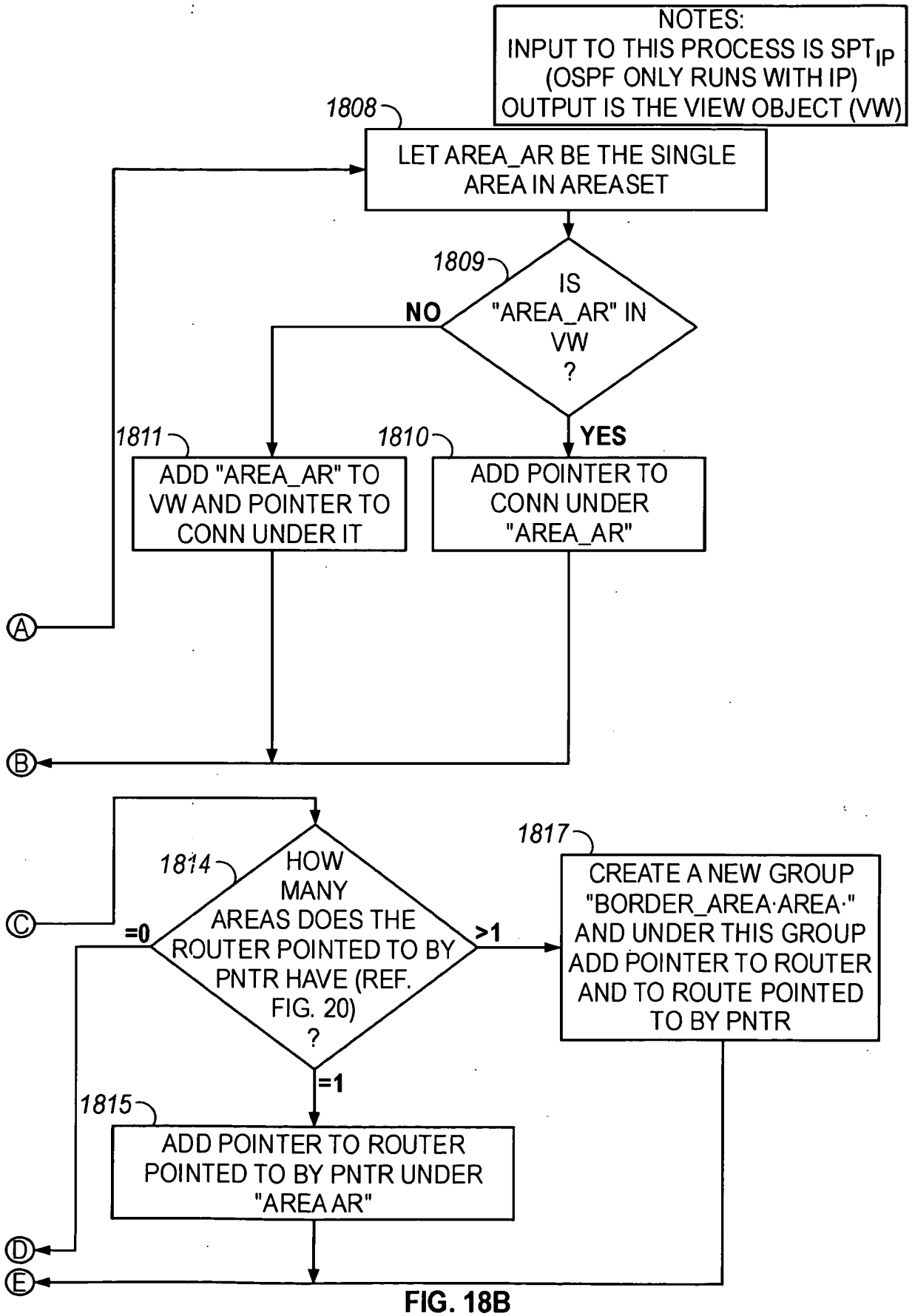

NOTES:
INPUT TO THIS PROCESS IS SPT IP
(OSPF ONLY RUNS WITH IP)
OUTPUT IS THE VIEW OBJECT (VW)
1808
LET AREA_AR BE THE SINGLE AREA IN AREASET
1809
IS "AREA_AR" IN VW ?
NO
YES
1811
ADD "AREA_AR" TO VW AND POINTER TO CONN UNDER IT
1810
ADD POINTER TO CONN UNDER "AREA_AR"
A
B
C
1814
HOW MANY AREAS DOES THE ROUTER POINTED TO BY PNTR HAVE (REF. FIG. 20) ?
=0
>1
=1
1817
CREATE A NEW GROUP "BORDER_AREA·AREA·" AND UNDER THIS GROUP ADD POINTER TO ROUTER AND TO ROUTE POINTED TO BY PNTR
1815
ADD POINTER TO ROUTER POINTED TO BY PNTR UNDER "AREA AR"
D
E

FIG. 18B

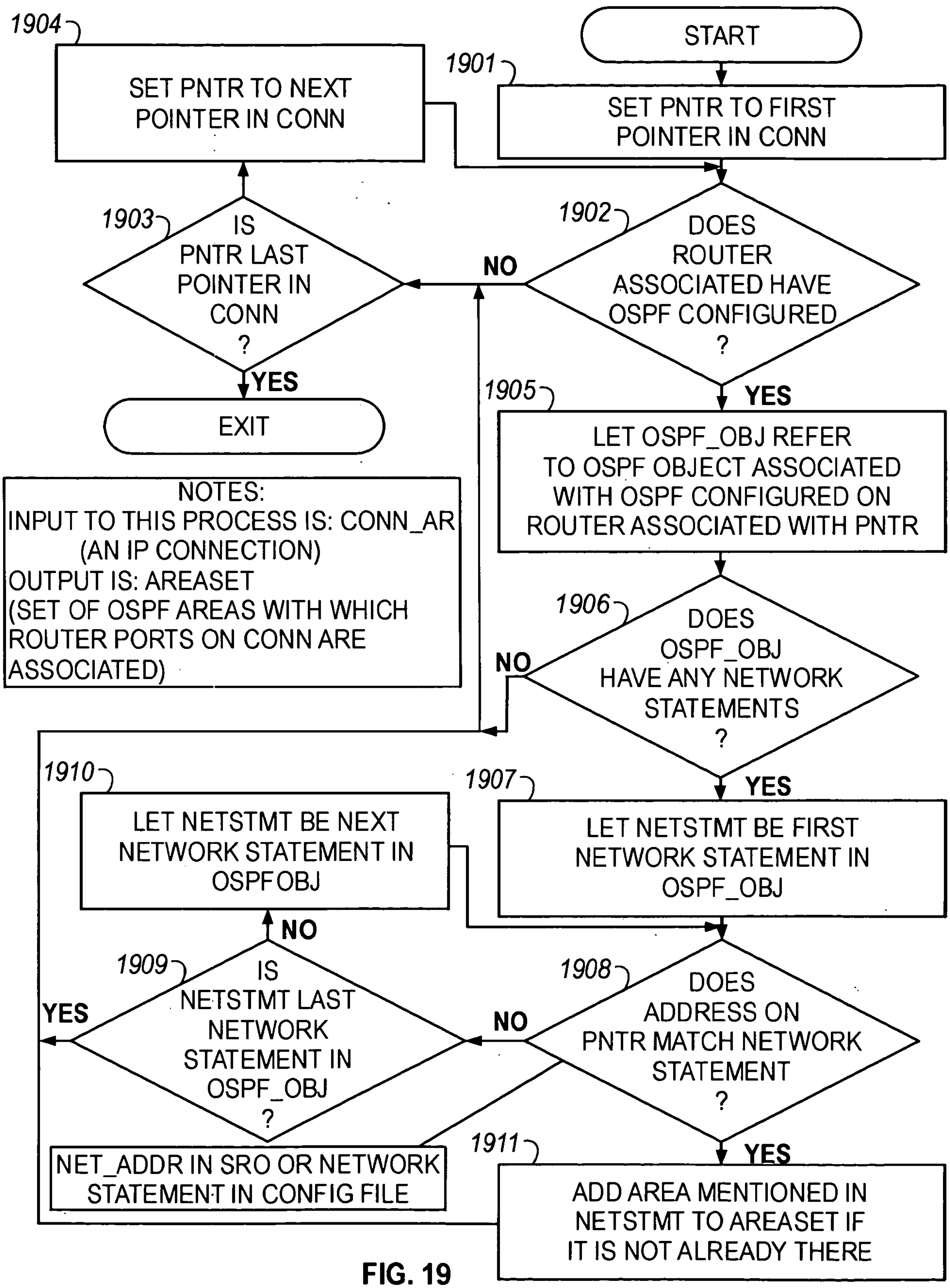


FIG. 19

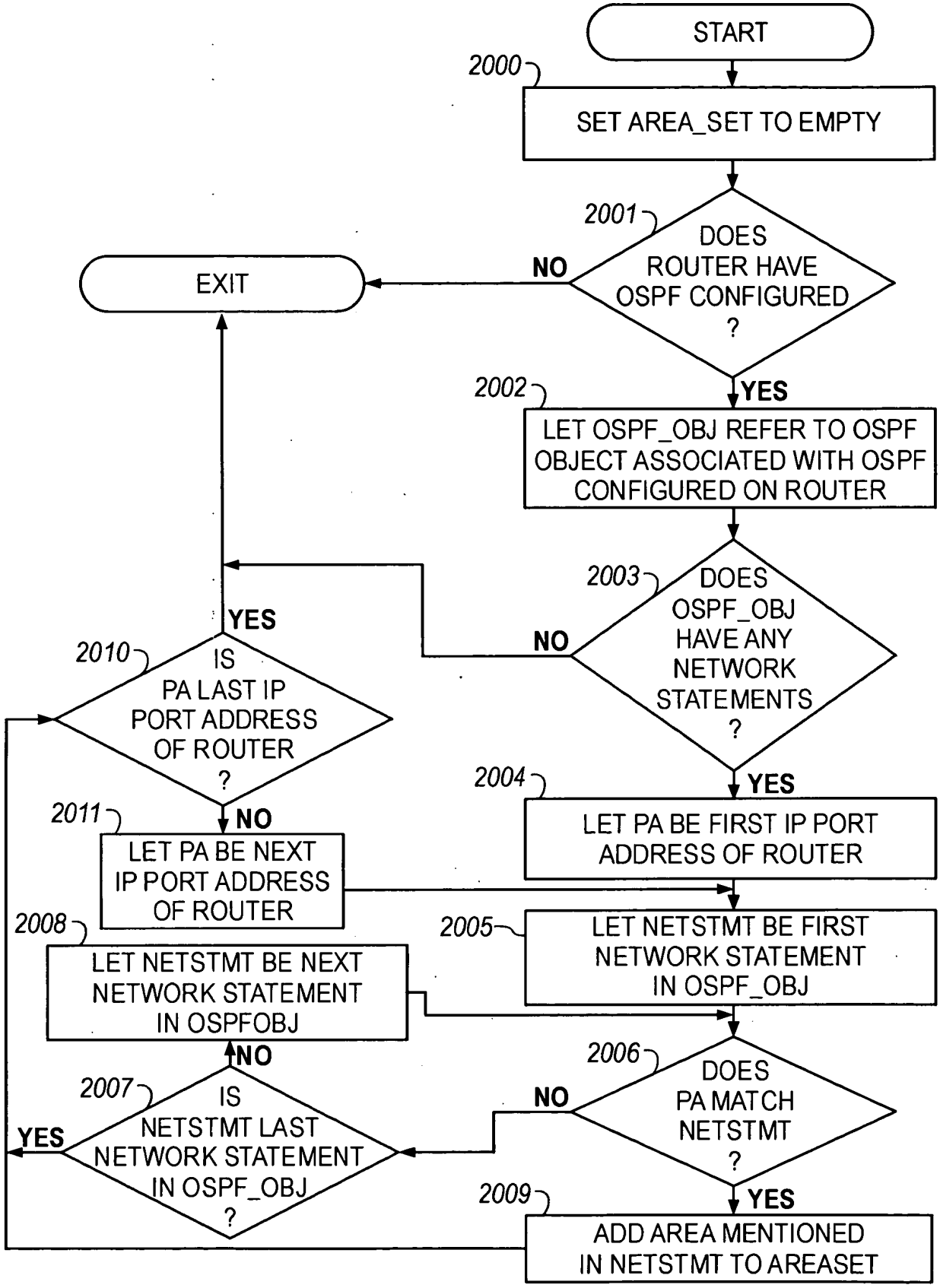


FIG. 20

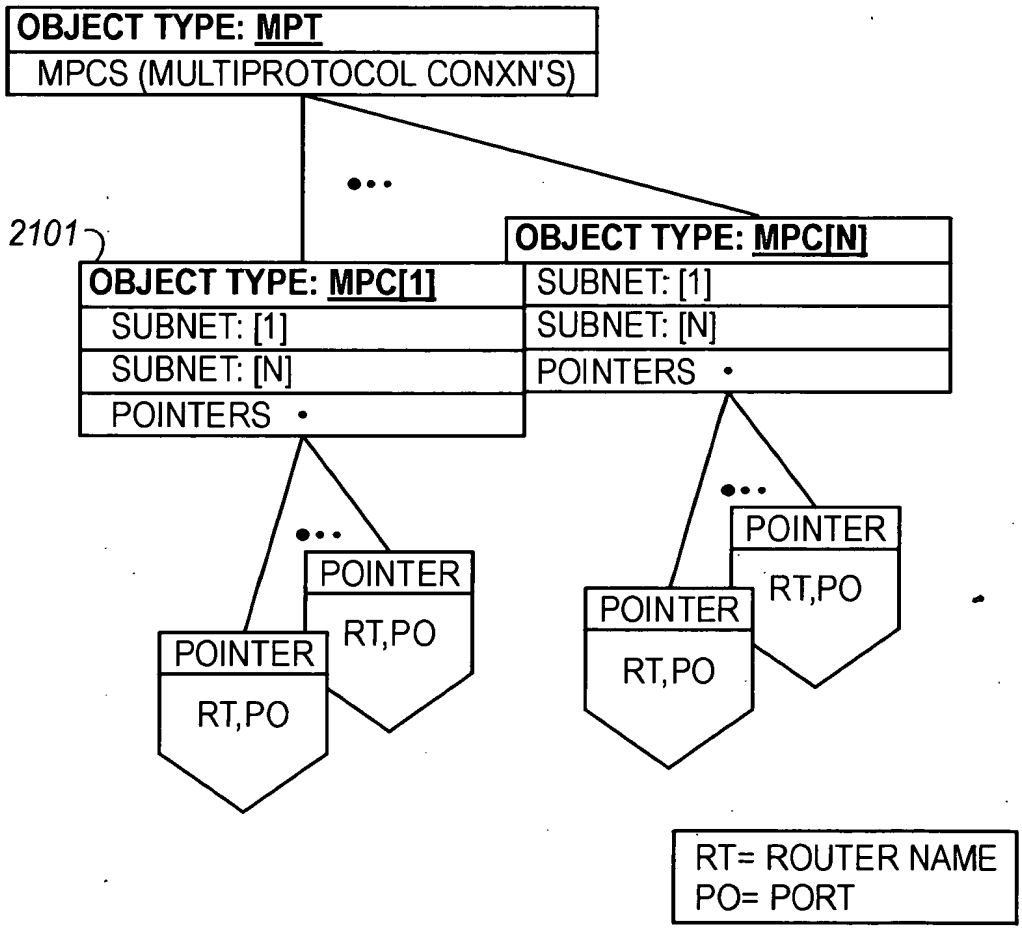


FIG. 21

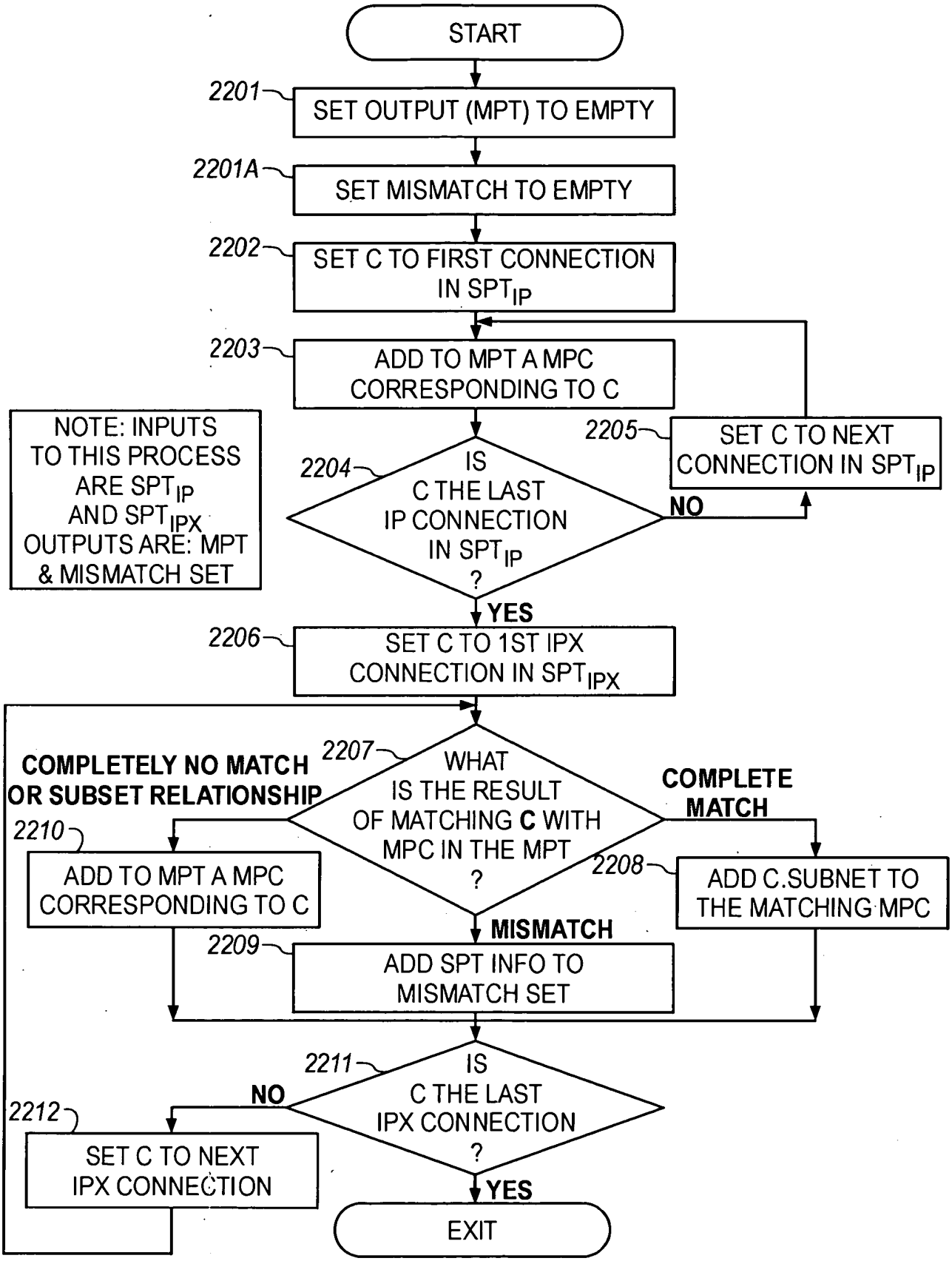


FIG. 22

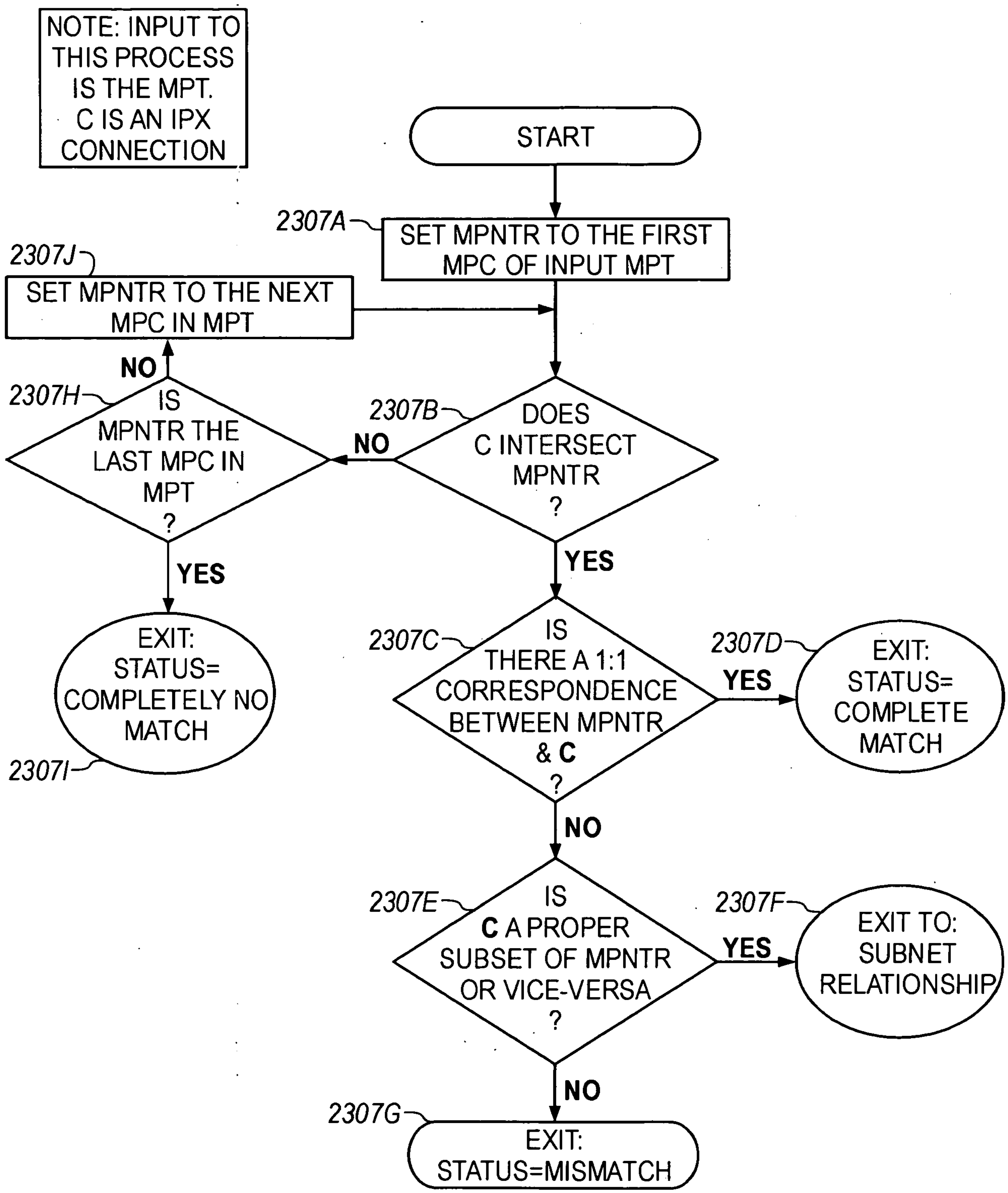


FIG. 23

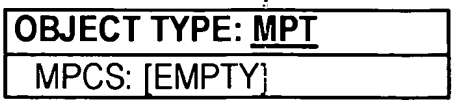


FIG. 24A

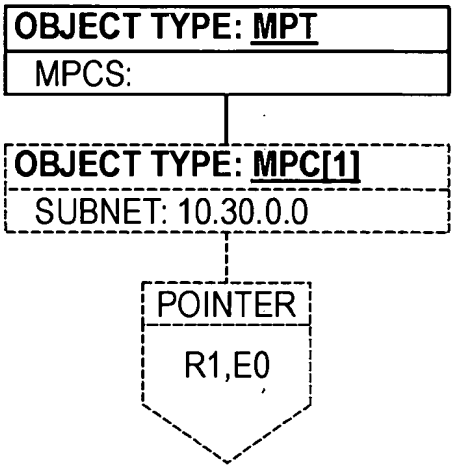


FIG. 24B

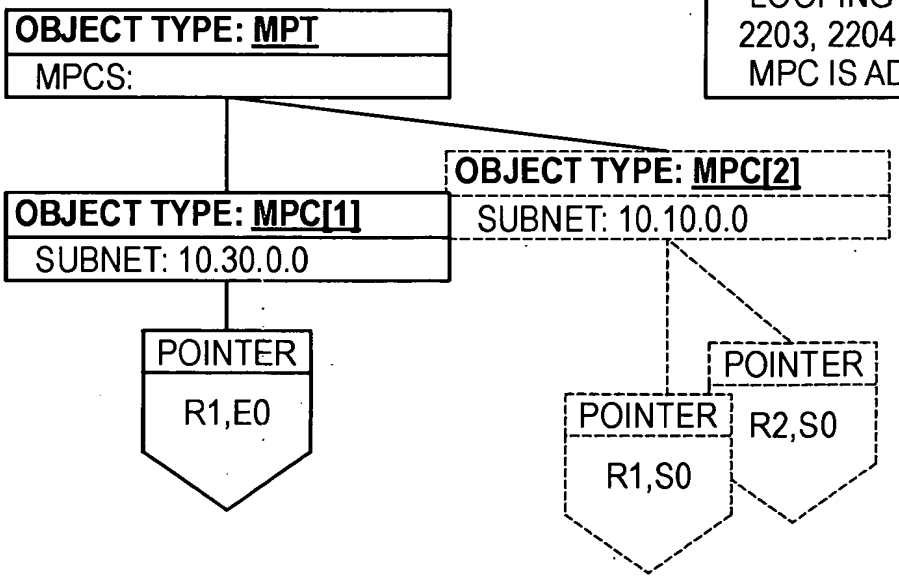
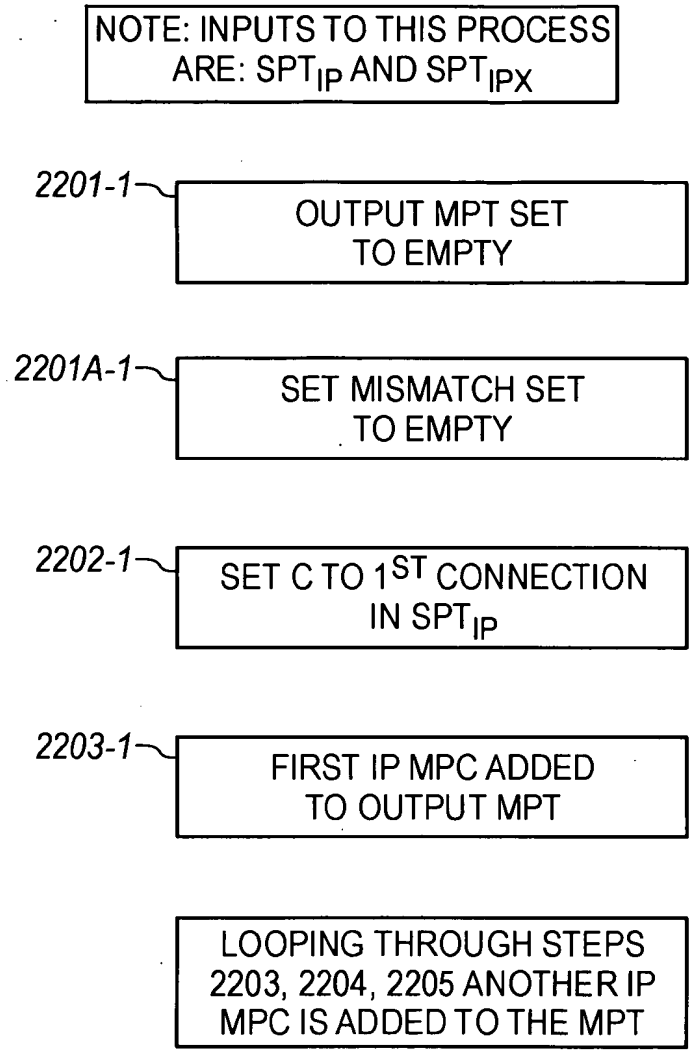


FIG. 24C



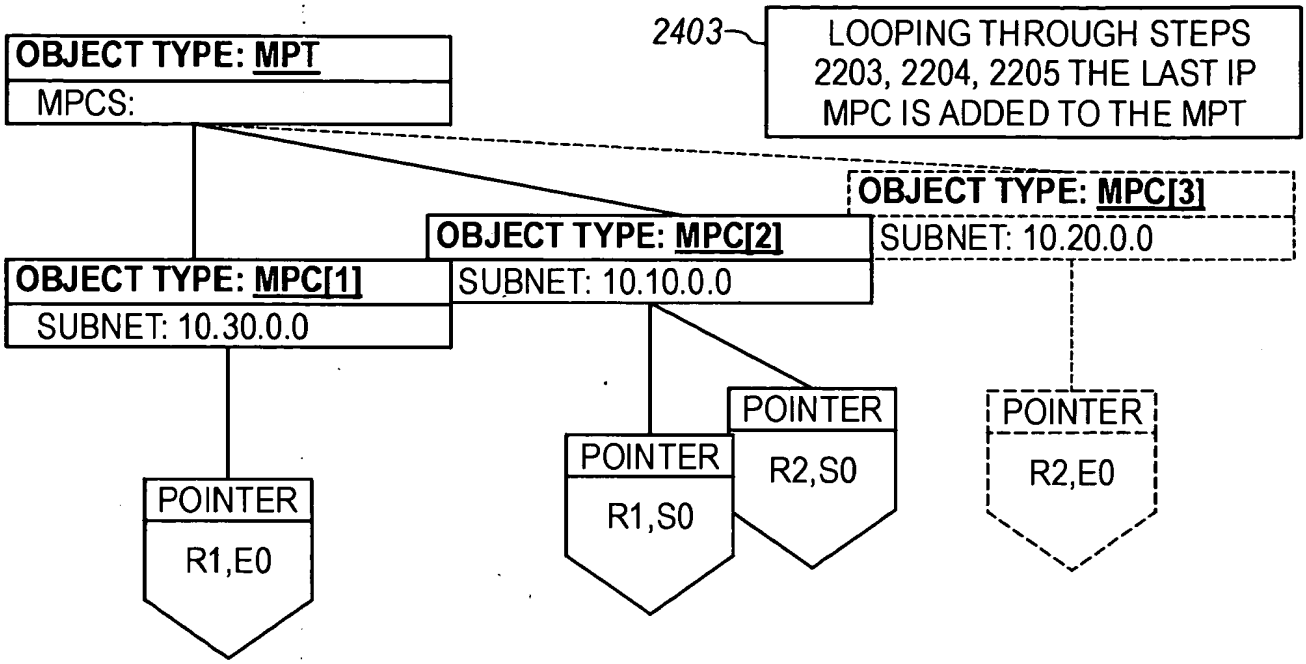


FIG. 24D

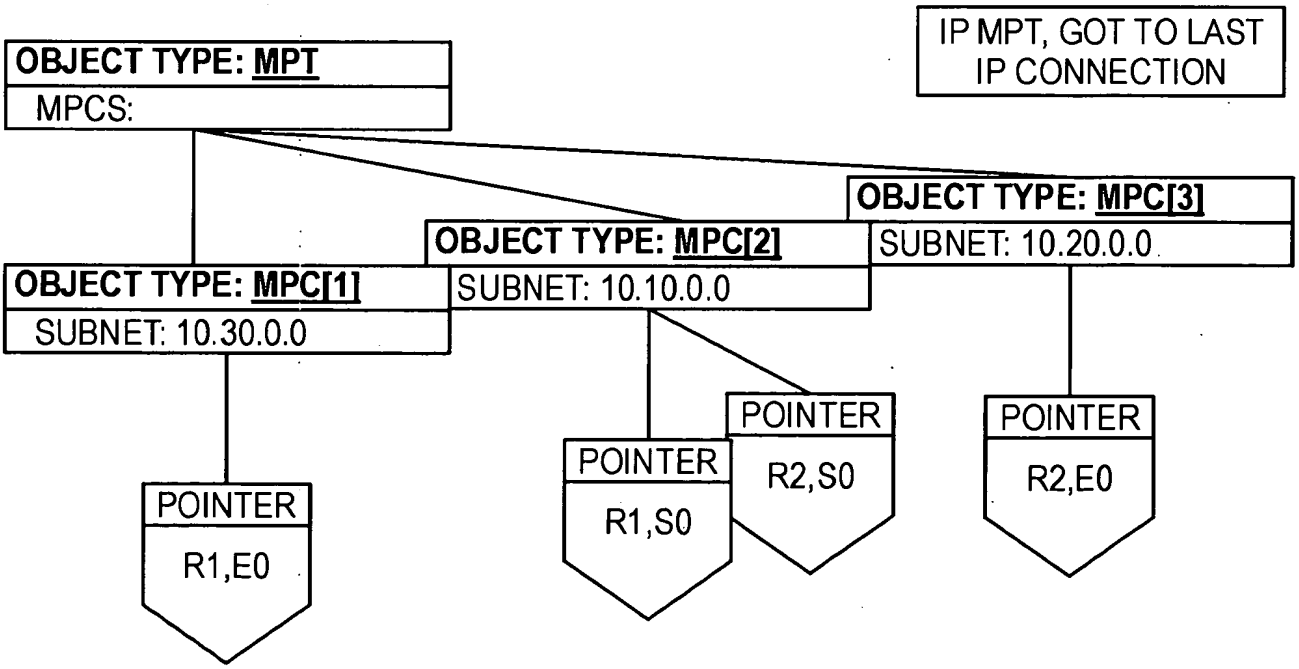


FIG. 24E

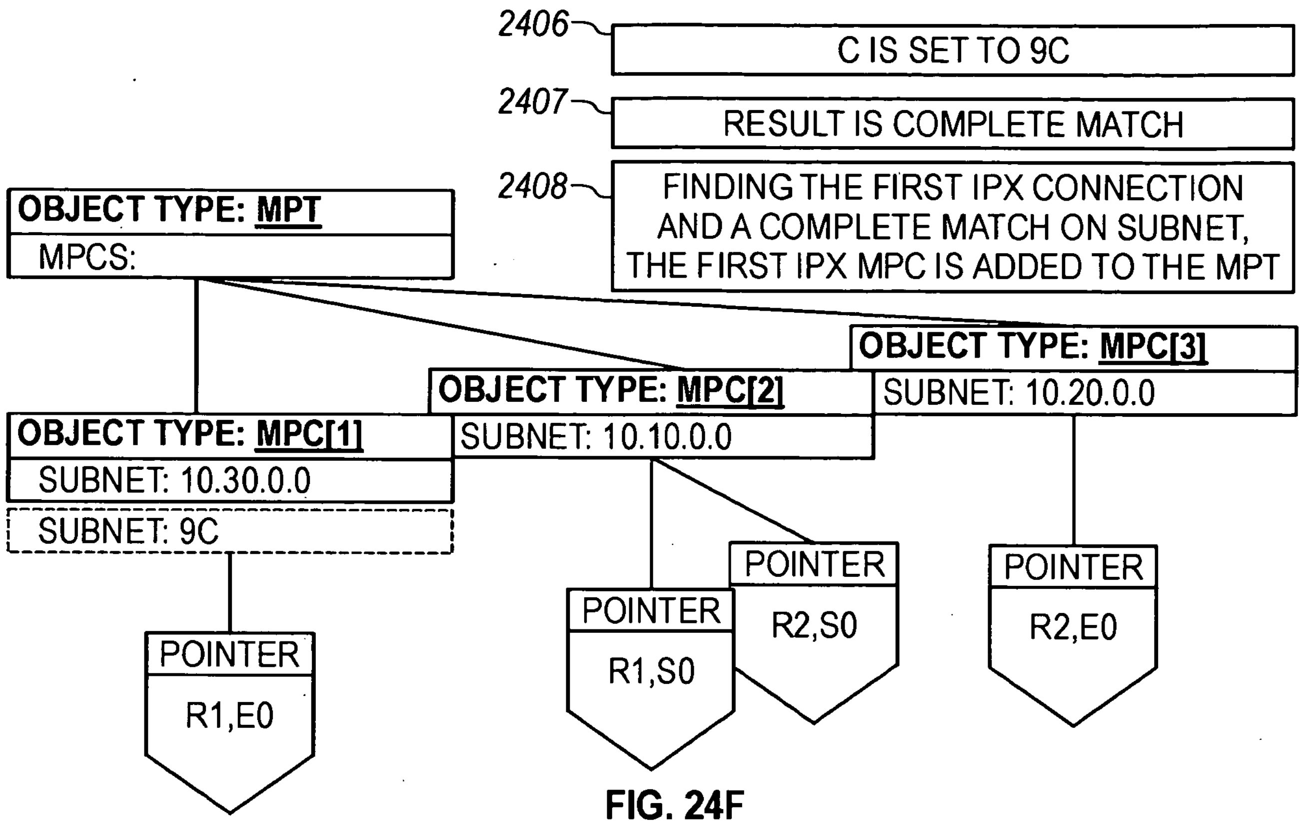


FIG. 24F

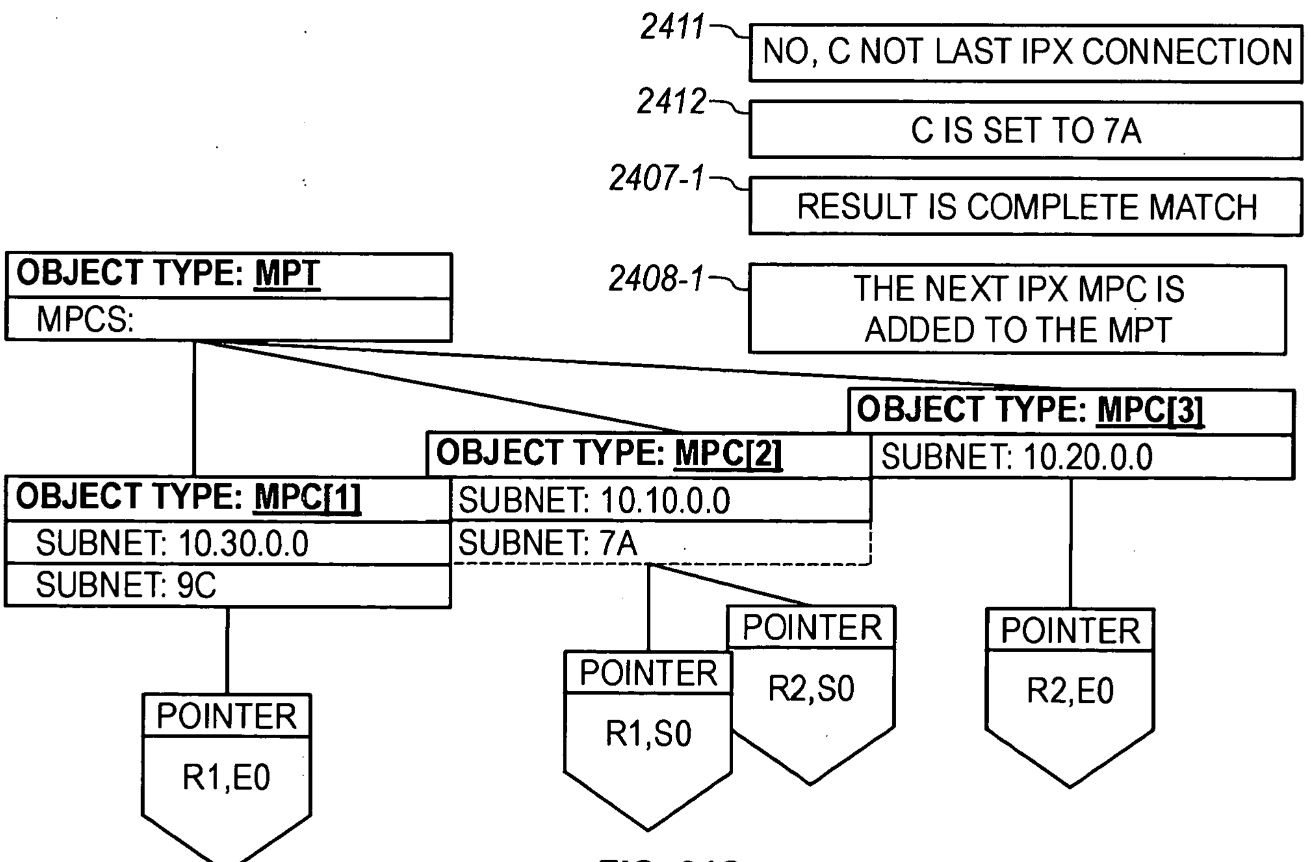


FIG. 24G

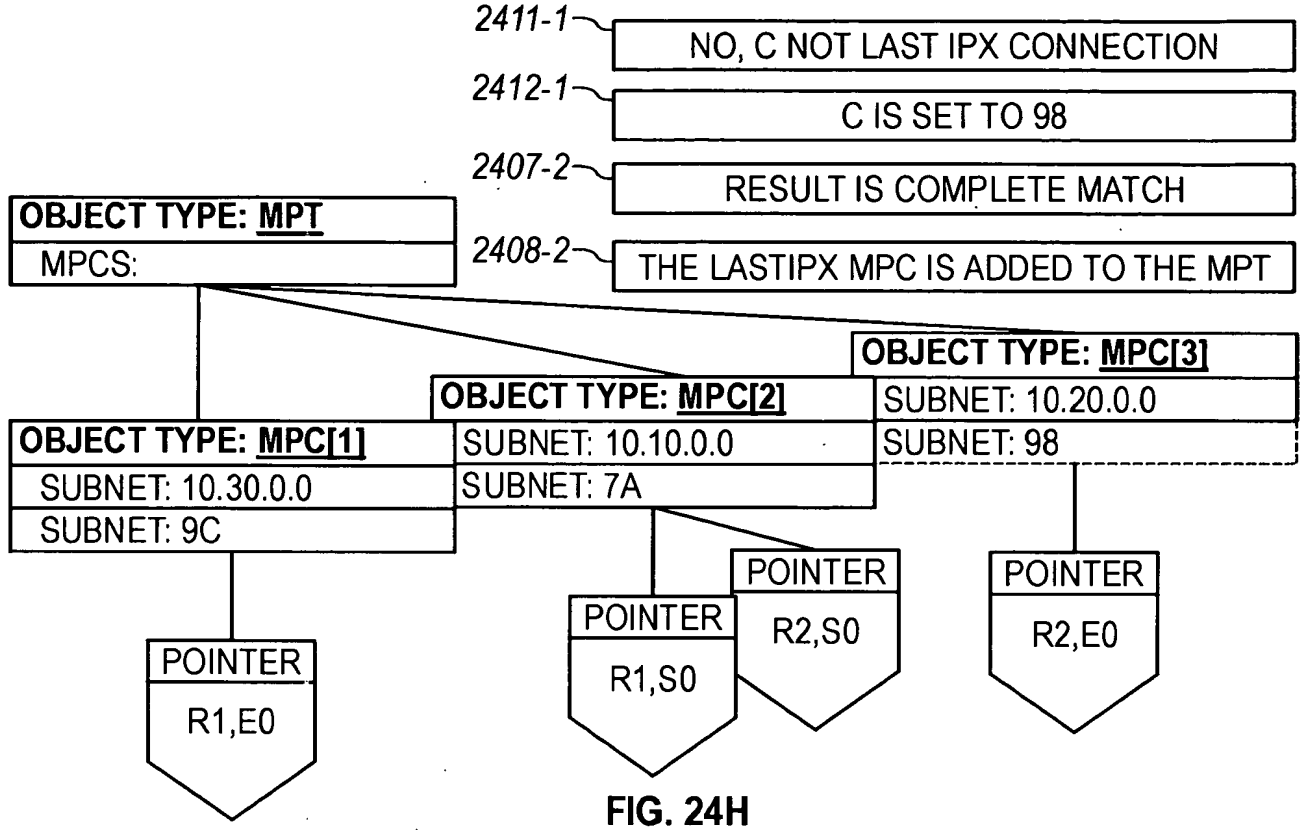


FIG. 24H

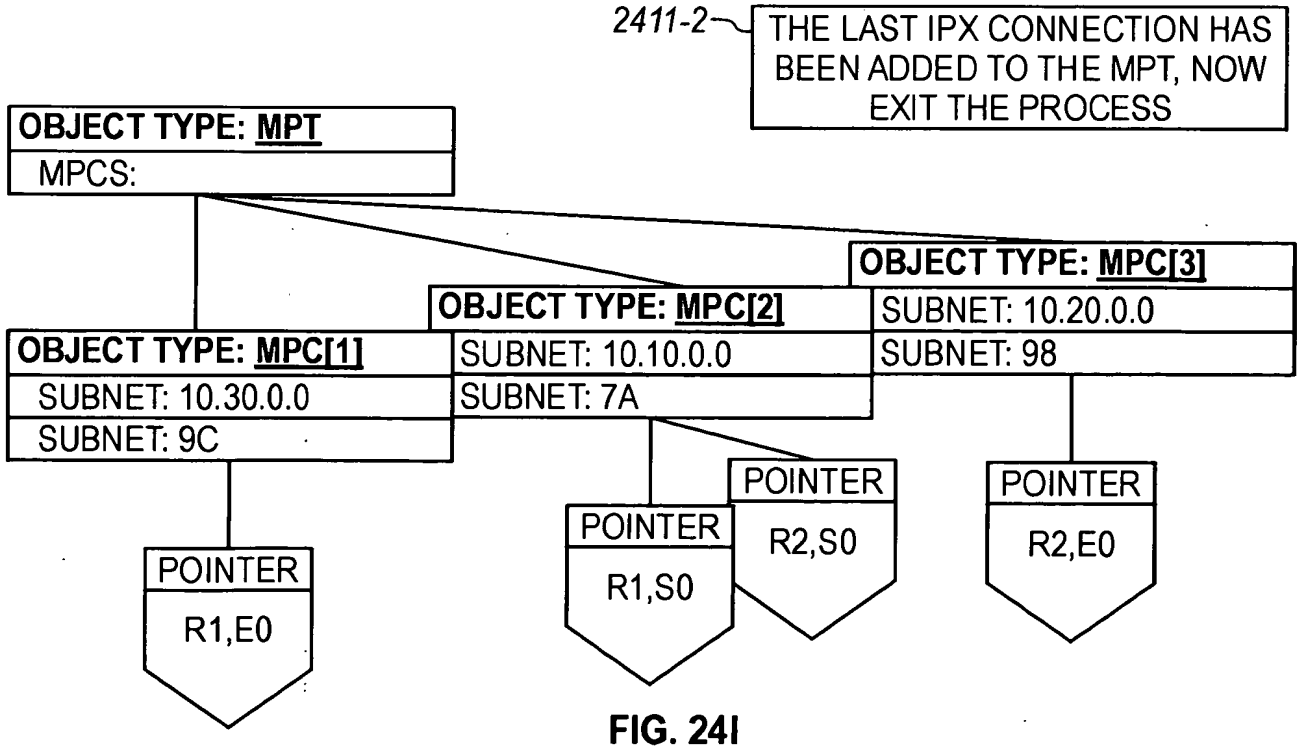


FIG. 24I

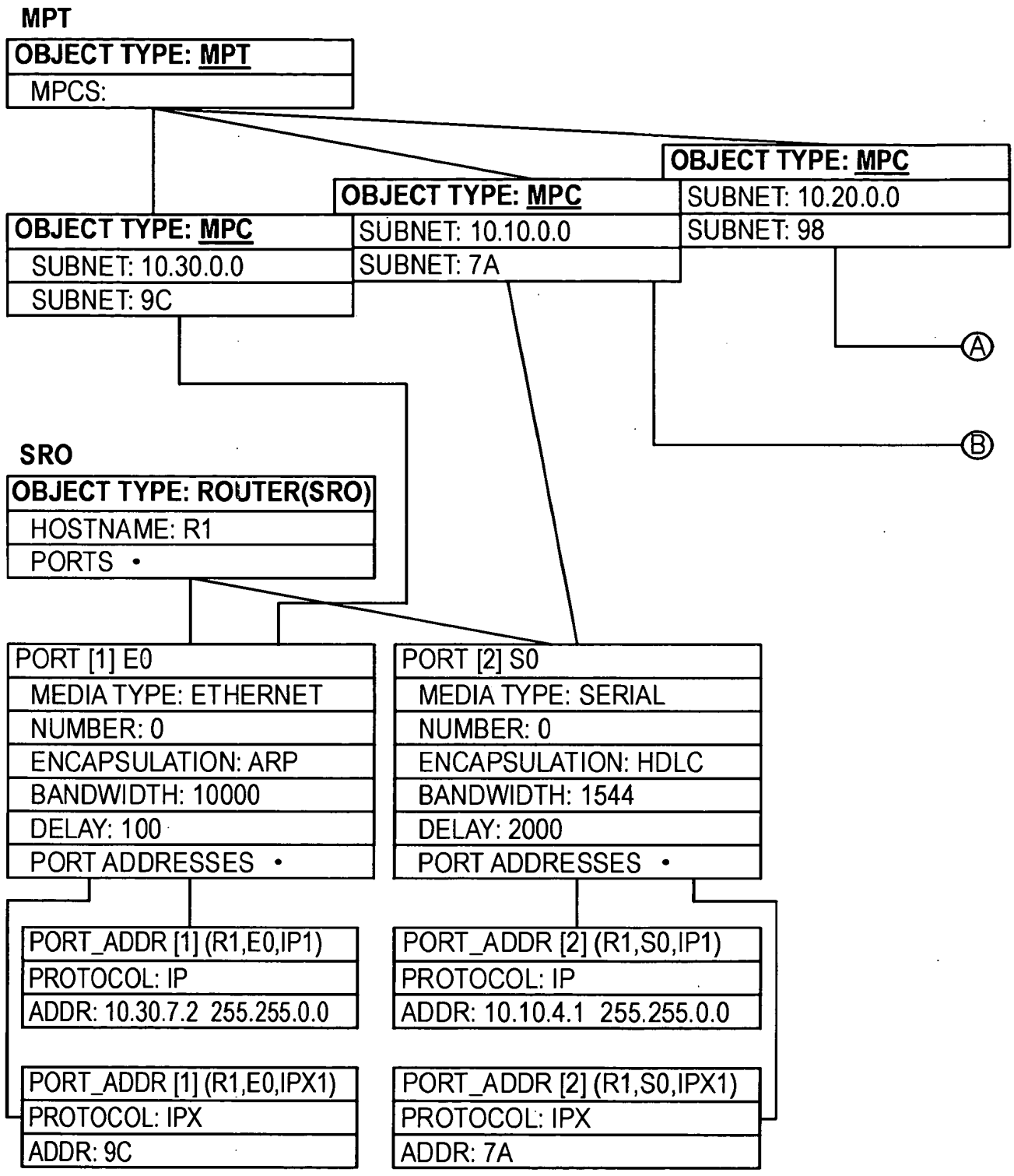


FIG. 25A

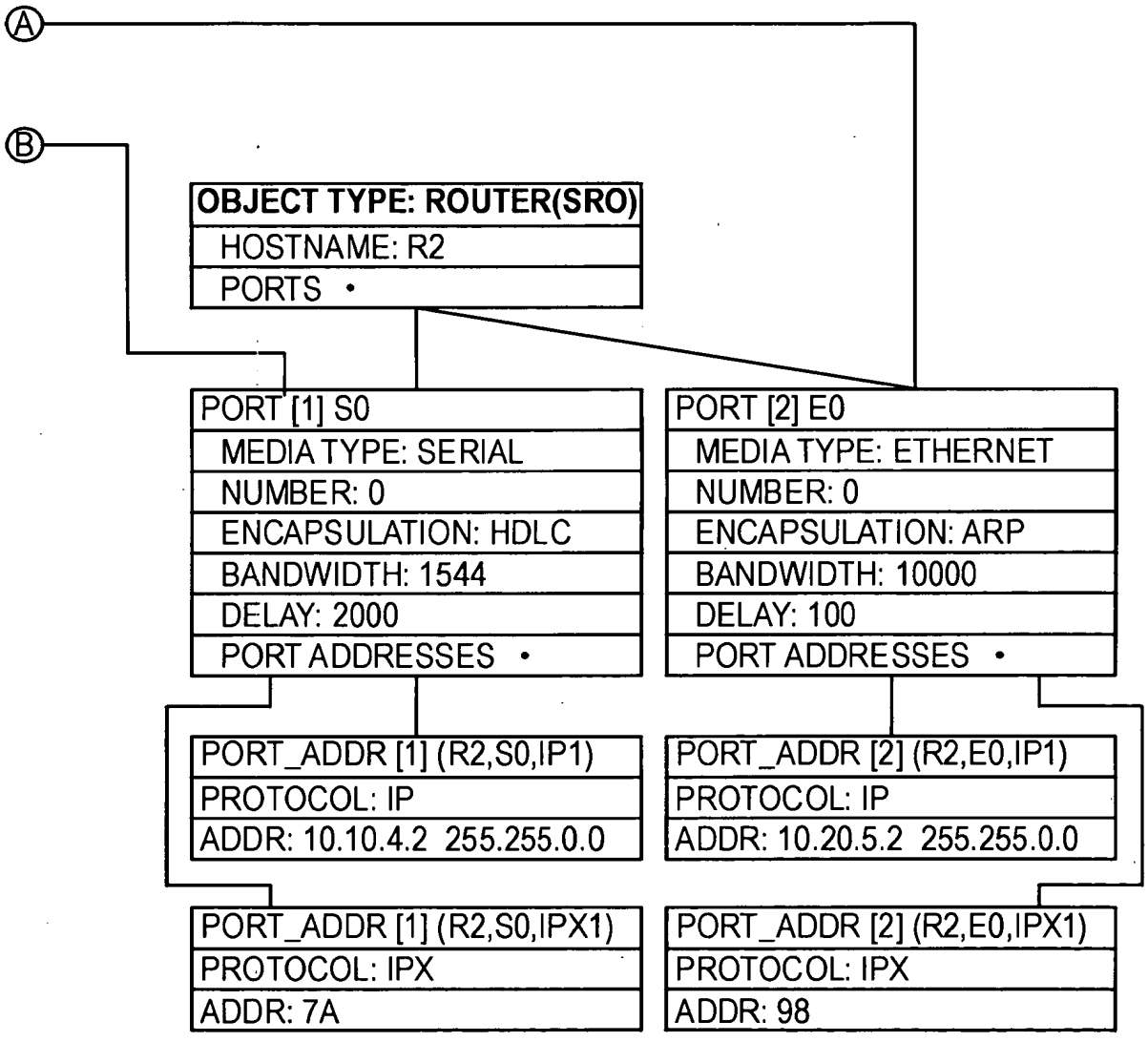
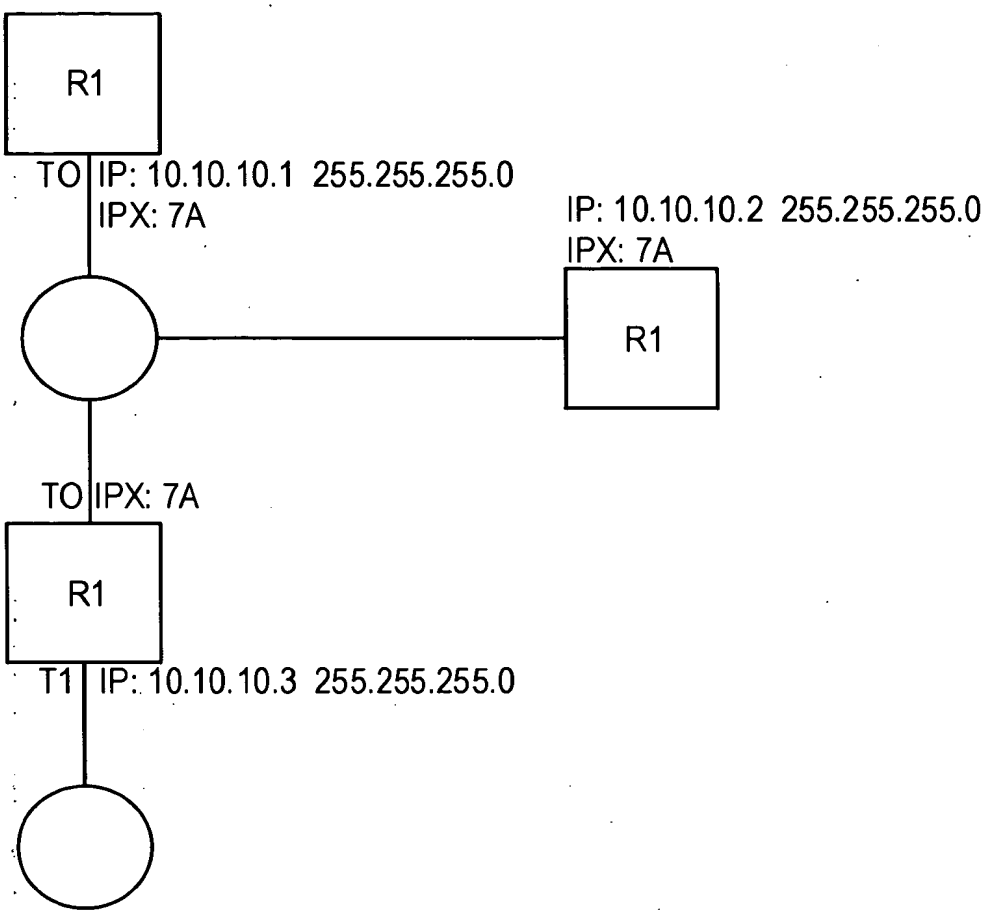


FIG. 25B



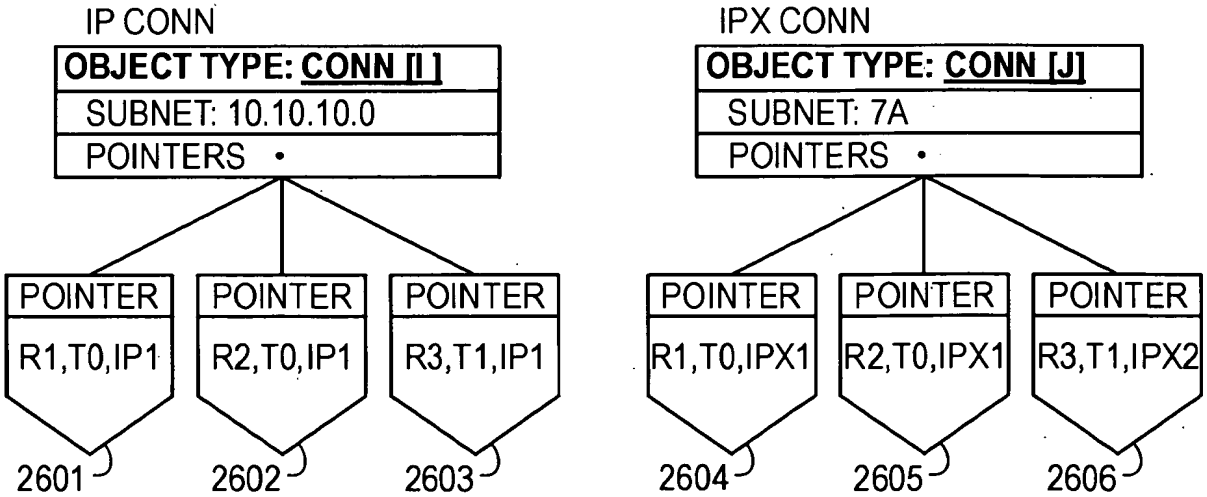


FIG. 26

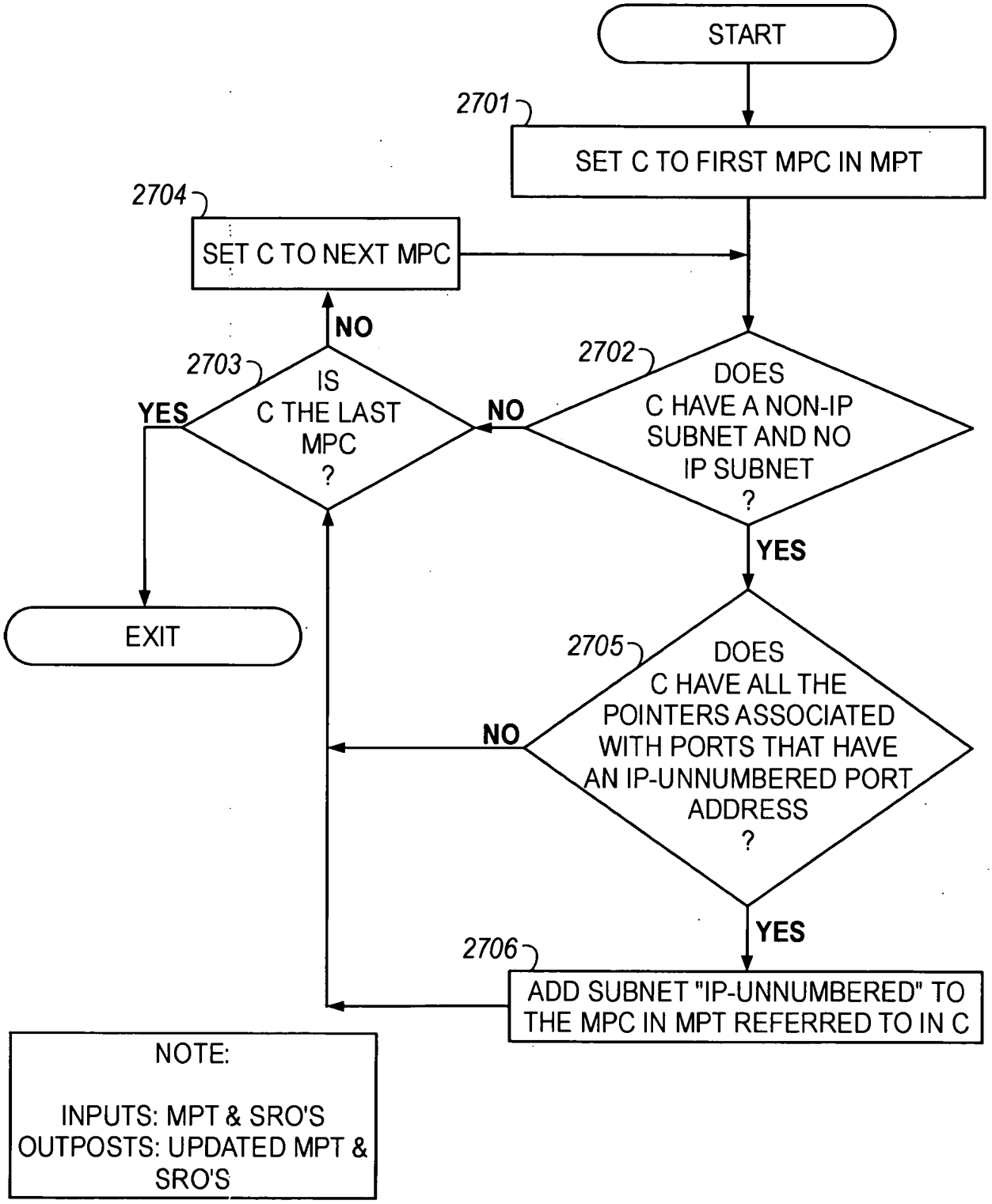

START
2701
SET C TO FIRST MPC IN MPT
2704
SET C TO NEXT MPC
NO
2703
IS C THE LAST MPC ?
YES
NO
2702
DOES C HAVE A NON-IP SUBNET AND NO IP SUBNET ?
YES
EXIT
2705
DOES C HAVE ALL THE POINTERS ASSOCIATED WITH PORTS THAT HAVE AN IP-UNNUMBERED PORT ADDRESS ?
NO
YES
2706
ADD SUBNET "IP-UNNUMBERED" TO THE MPC IN MPT REFERRED TO IN C
NOTE:
INPUTS: MPT & SRO'S
OUTPOSTS: UPDATED MPT & SRO'S

FIG. 27

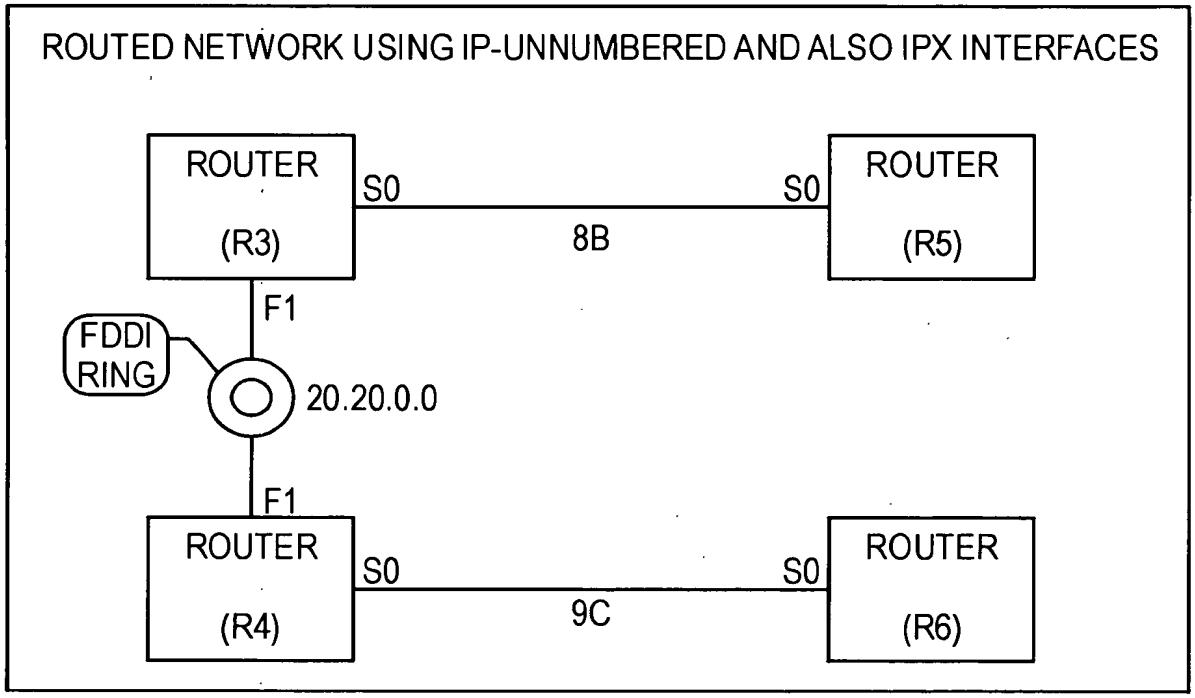


FIG. 28

ROUTER R3: 2901

```
VERSION 10.0
!
HOSTNAME R3
!
NOVELL ROUTING 0000.0C08.94DD
!
INTERFACE LOOPBACK 1
IP ADDRESS 122.33.2.1  255.255.0.0

INTERFACE SERIAL0
IP-UNNUMBERED LOOPBACK 1
IPX NETWORK 8B
!
INTERFACE FDDI 0
IP ADDRESS 20.20.1.1  255.255.0.0
END
```

FIG. 29A

ROUTER R4:

```
VERSION 10.0
!
HOSTNAME R4
!
NOVELL ROUTING 0000.0C04.3A3E
!
INTERFACE LOOPBACK 1
IP ADDRESS 127.38.7.6  255.255.0.0

INTERFACE SERIAL0
IP-UNNUMBERED LOOPBACK 1
IPX NETWORK 9C
!
INTERFACE FDDI 0
IP ADDRESS 20.20.0.0  255.255.0.0
END
```

FIG. 29B

ROUTER R5:

```
VERSION 10.0
!
HOSTNAME R5
!
NOVELL ROUTING 0000.0D09.A5EE
!
INTERFACE LOOPBACK 1
IP ADDRESS 127.38.7.6  255.255.0.0

INTERFACE SERIAL0
IP-UNNUMBERED LOOPBACK 1
IPX NETWORK 8B
!
END
```

FIG. 29C

ROUTER R6:

```
VERSION 10.0
!
HOSTNAME R6
!
NOVELL ROUTING 0000.0D05.4B4F
!
INTERFACE LOOPBACK 1
IP ADDRESS 132.43.12.11  255.255.0.0

INTERFACE SERIAL0
IP-UNNUMBERED LOOPBACK 1
IPX NETWORK 9C
!
END
```

FIG. 29D

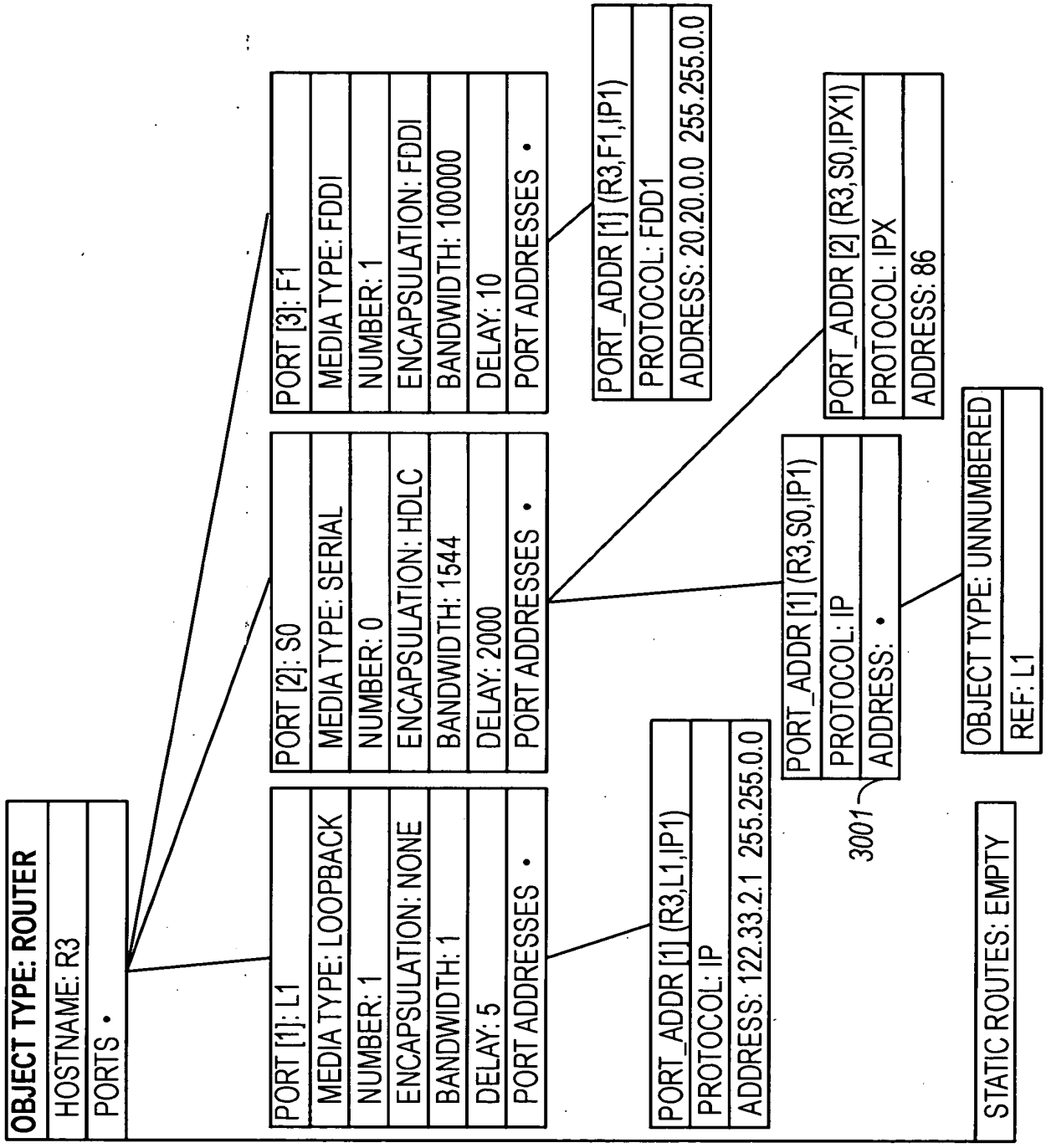


FIG. 30A

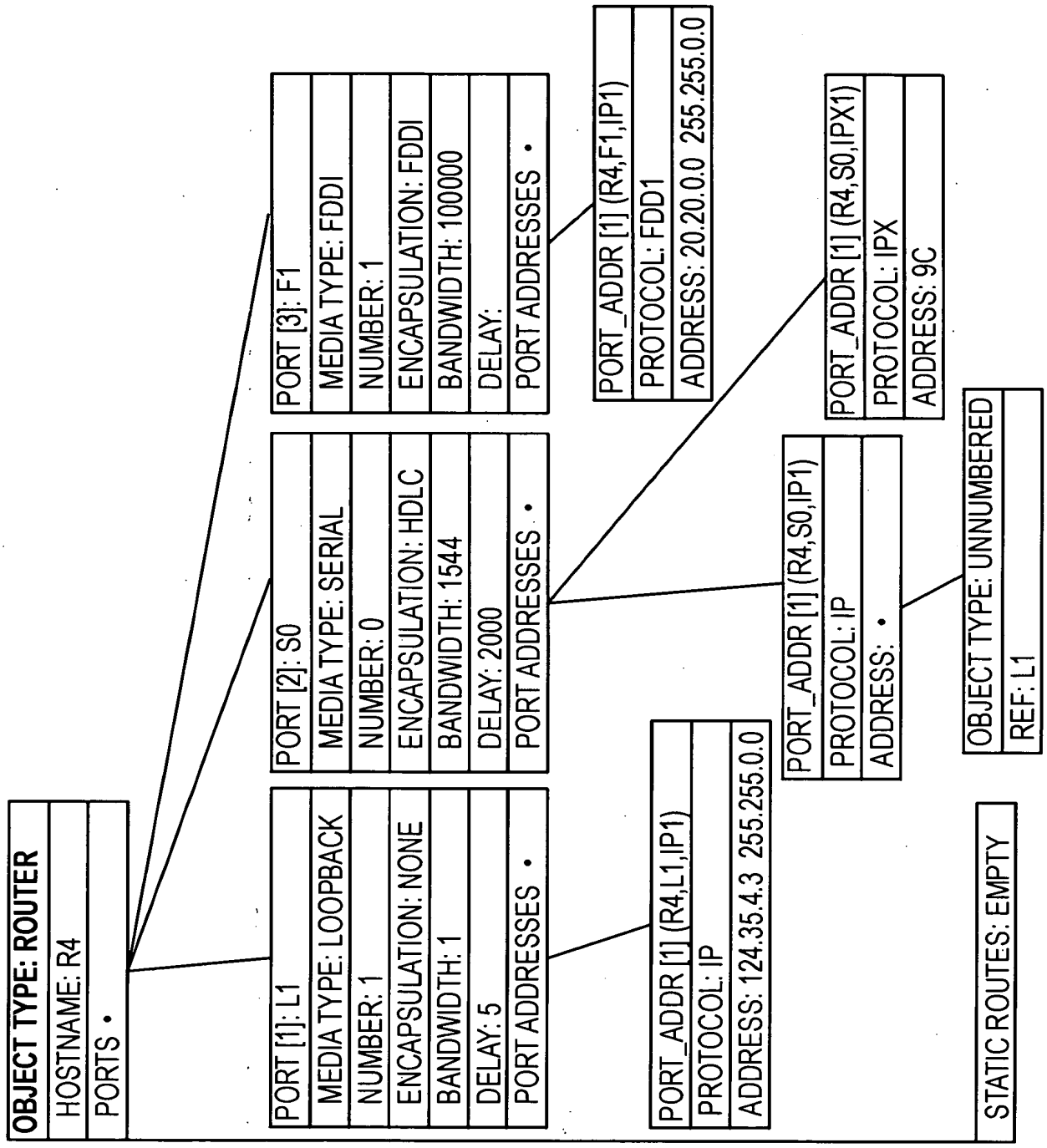


FIG. 30B

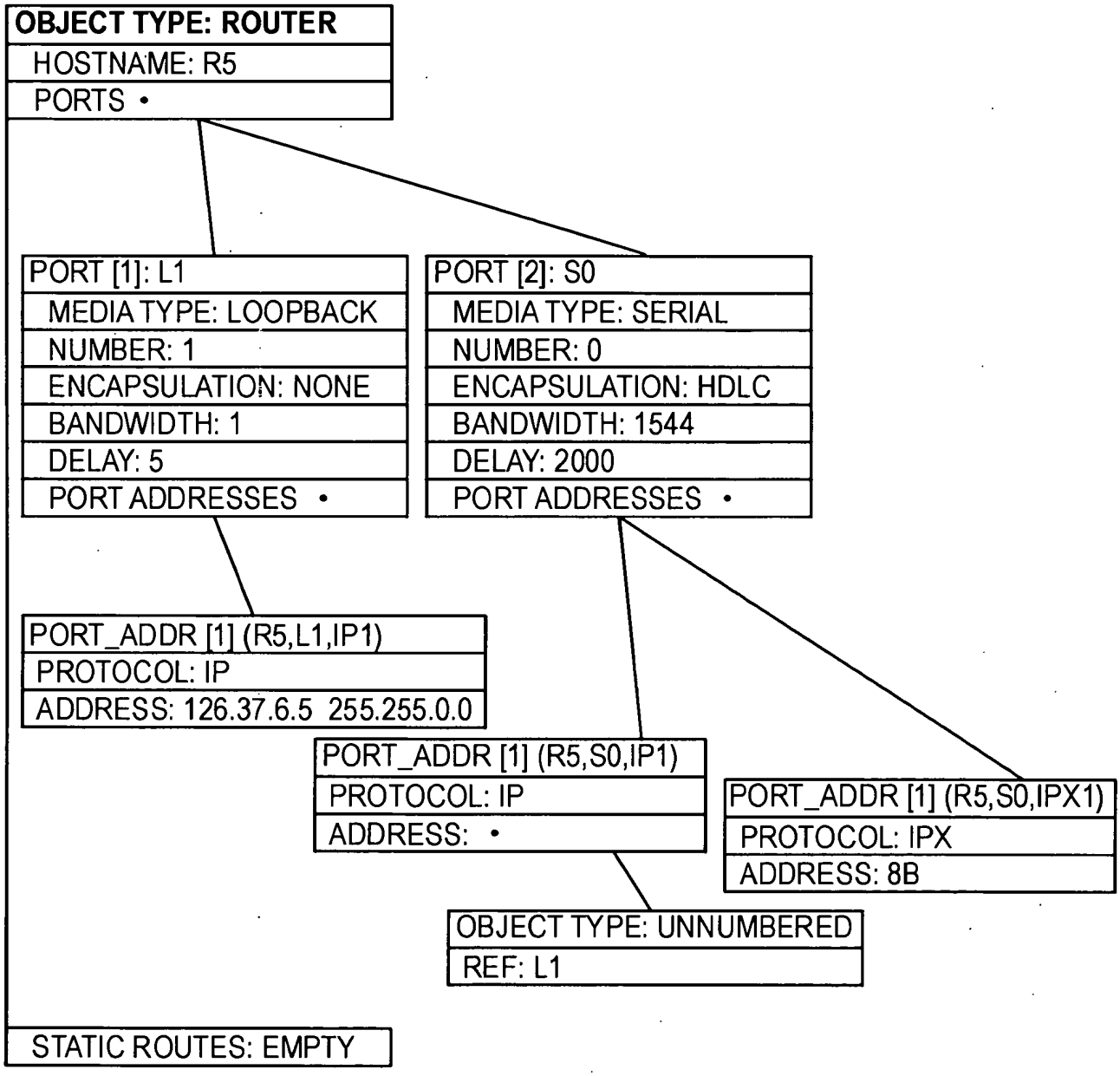

OBJECT TYPE: ROUTER
HOSTNAME: R5
PORTS •
PORT [1]: L1
MEDIA TYPE: LOOPBACK
NUMBER: 1
ENCAPSULATION: NONE
BANDWIDTH: 1
DELAY: 5
PORT ADDRESSES •
PORT [2]: S0
MEDIA TYPE: SERIAL
NUMBER: 0
ENCAPSULATION: HDLC
BANDWIDTH: 1544
DELAY: 2000
PORT ADDRESSES •
PORT_ADDR [1] (R5,L1,IP1)
PROTOCOL: IP
ADDRESS: 126.37.6.5 255.255.0.0
PORT_ADDR [1] (R5,S0,IP1)
PROTOCOL: IP
ADDRESS: •
PORT_ADDR [1] (R5,S0,IPX1)
PROTOCOL: IPX
ADDRESS: 8B
OBJECT TYPE: UNNUMBERED
REF: L1
STATIC ROUTES: EMPTY

FIG. 30C

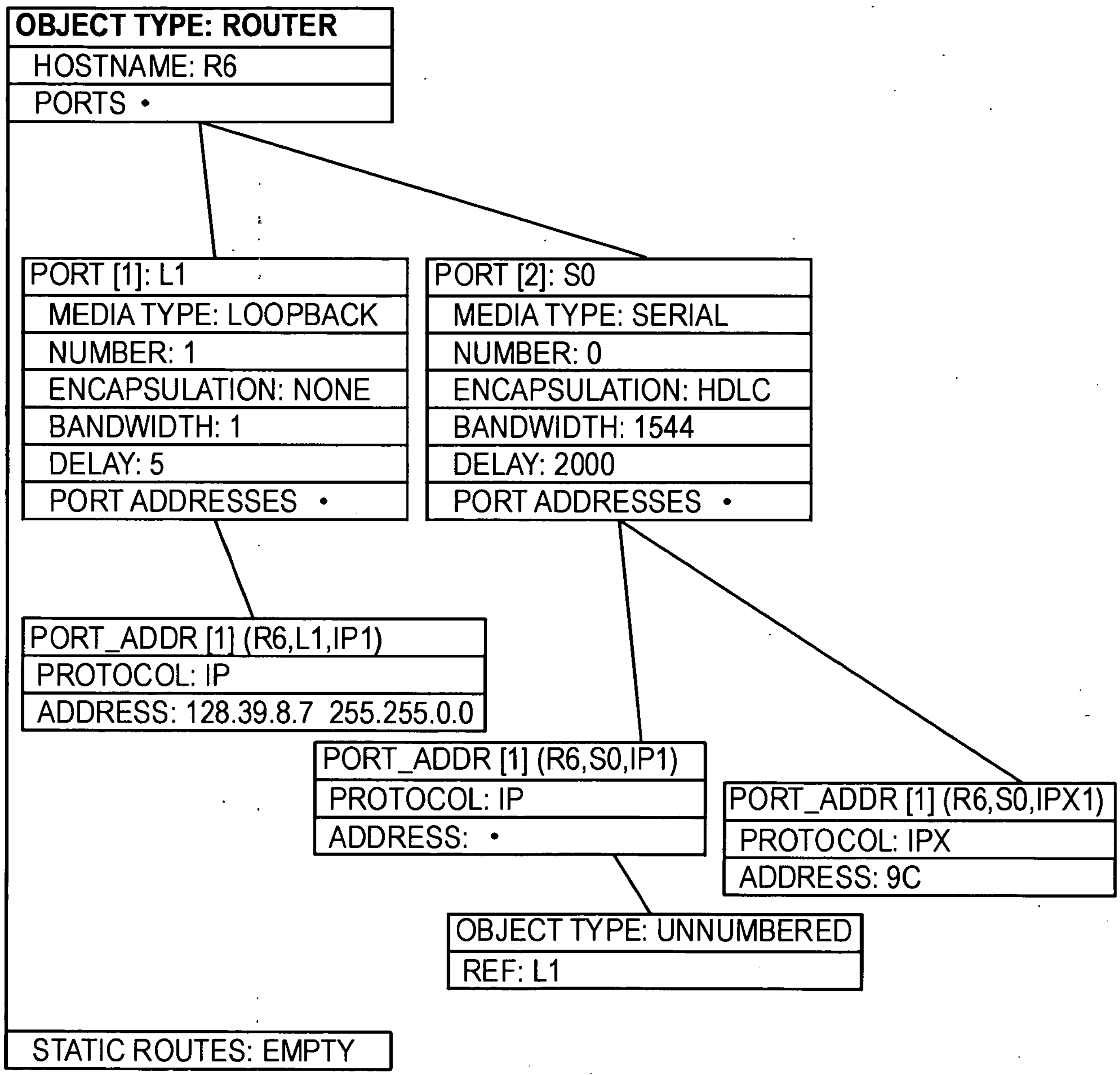


FIG. 30D

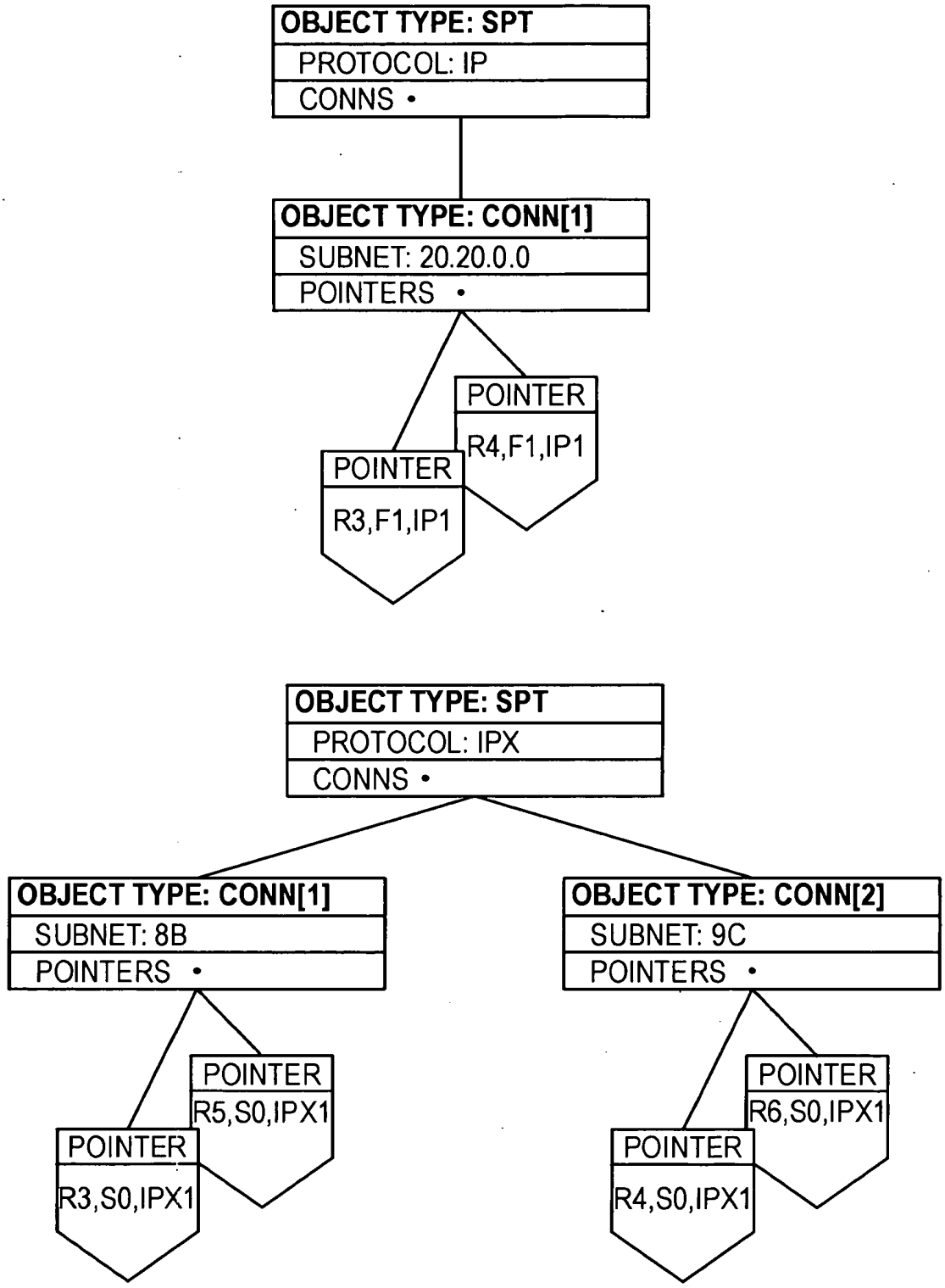


FIG. 30E

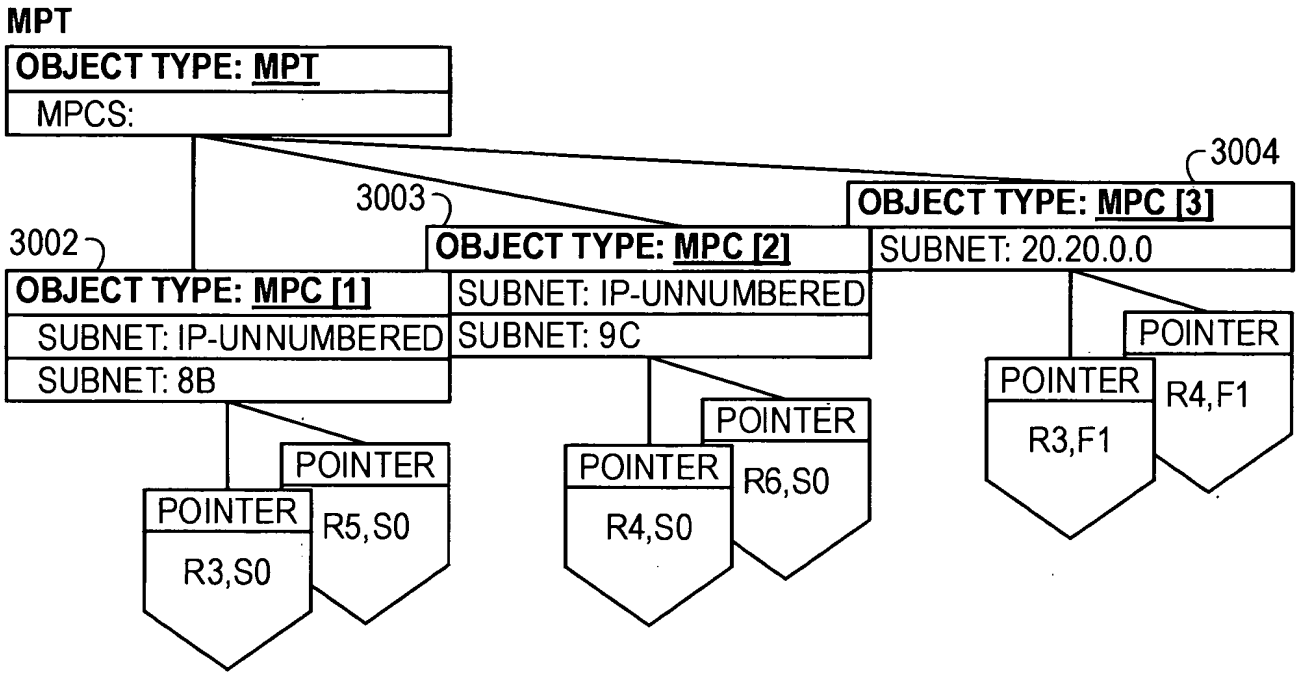


FIG. 30F

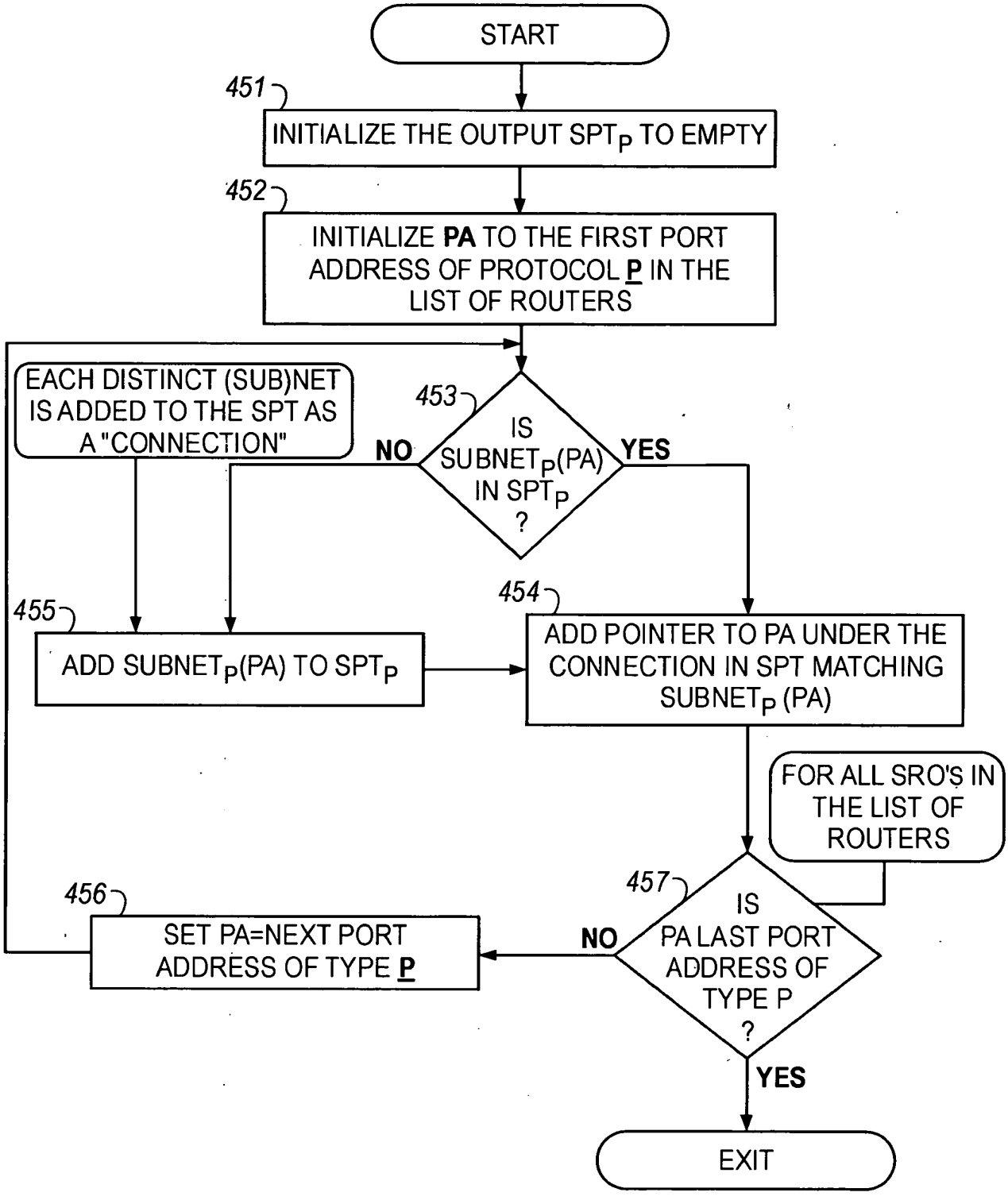


FIG. 31

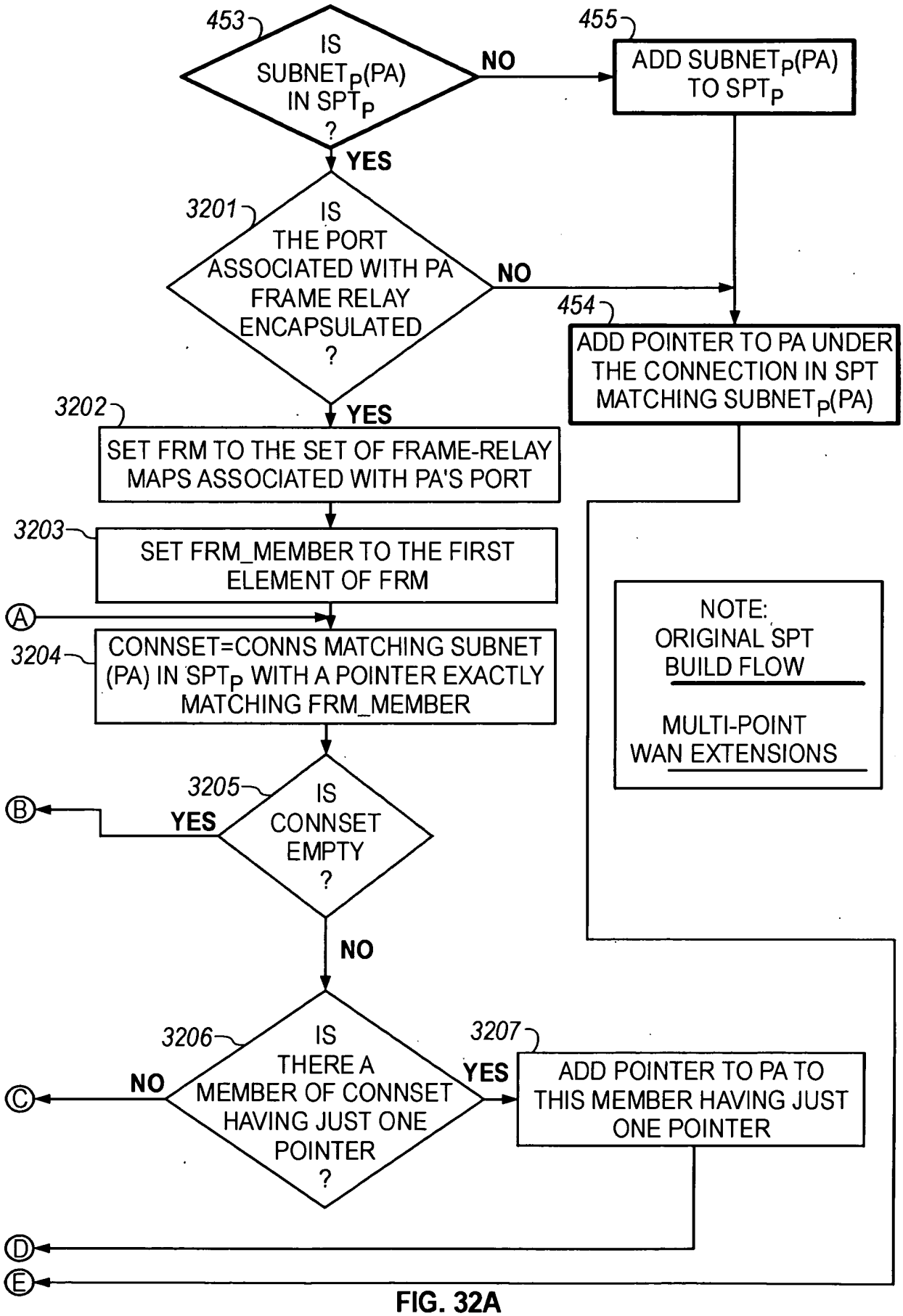


FIG. 32A

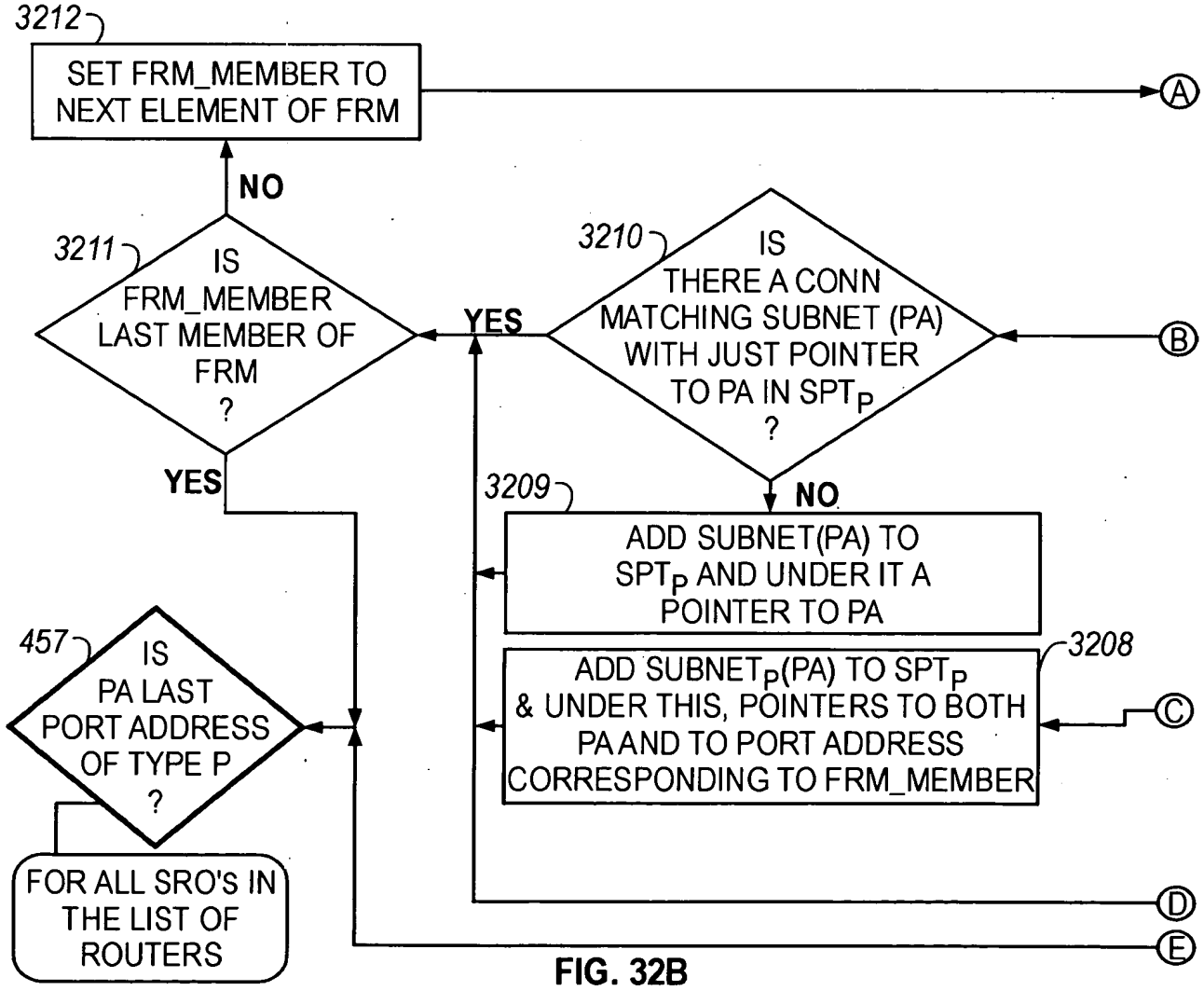


FIG. 32B

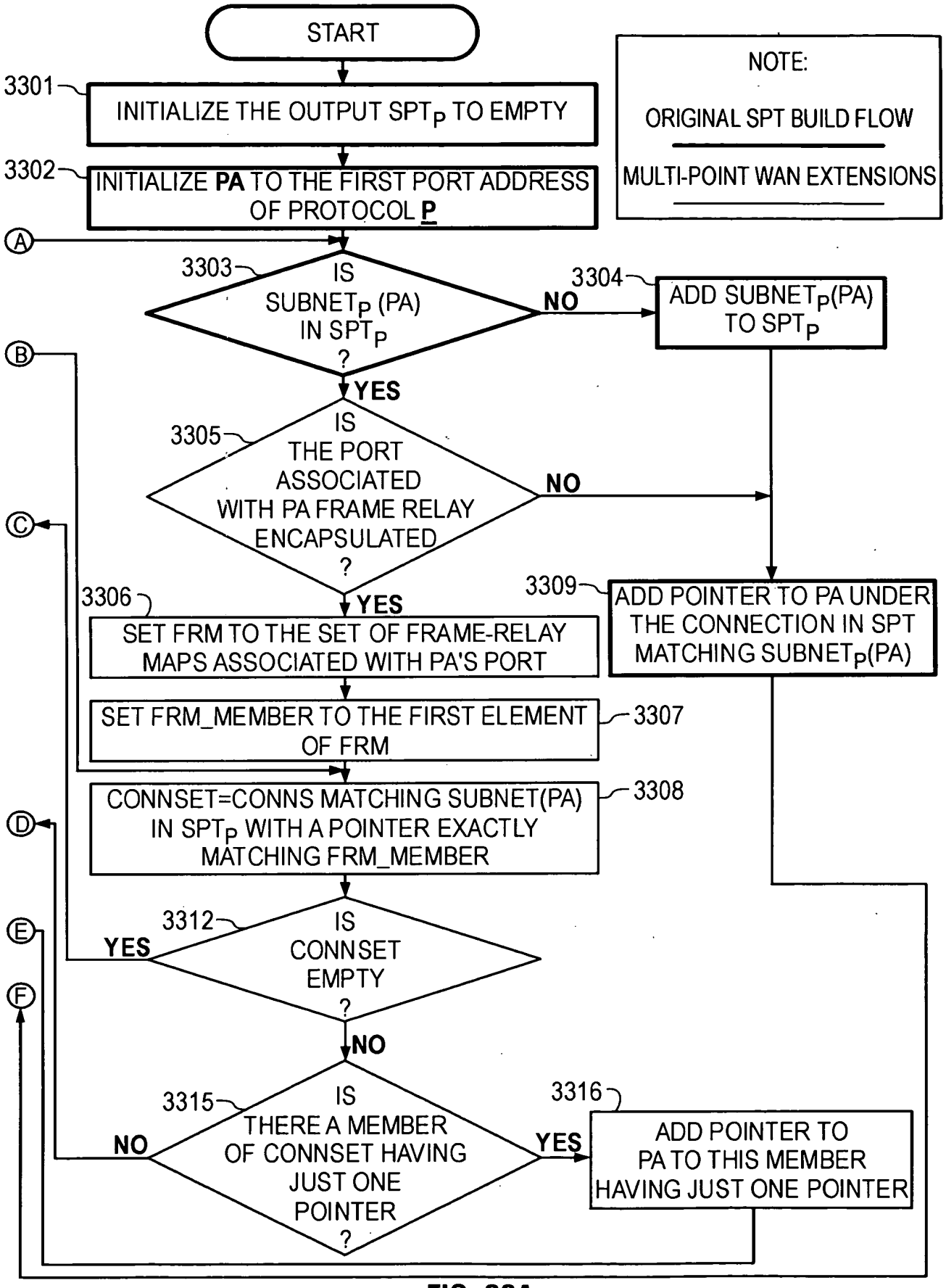


FIG. 33A

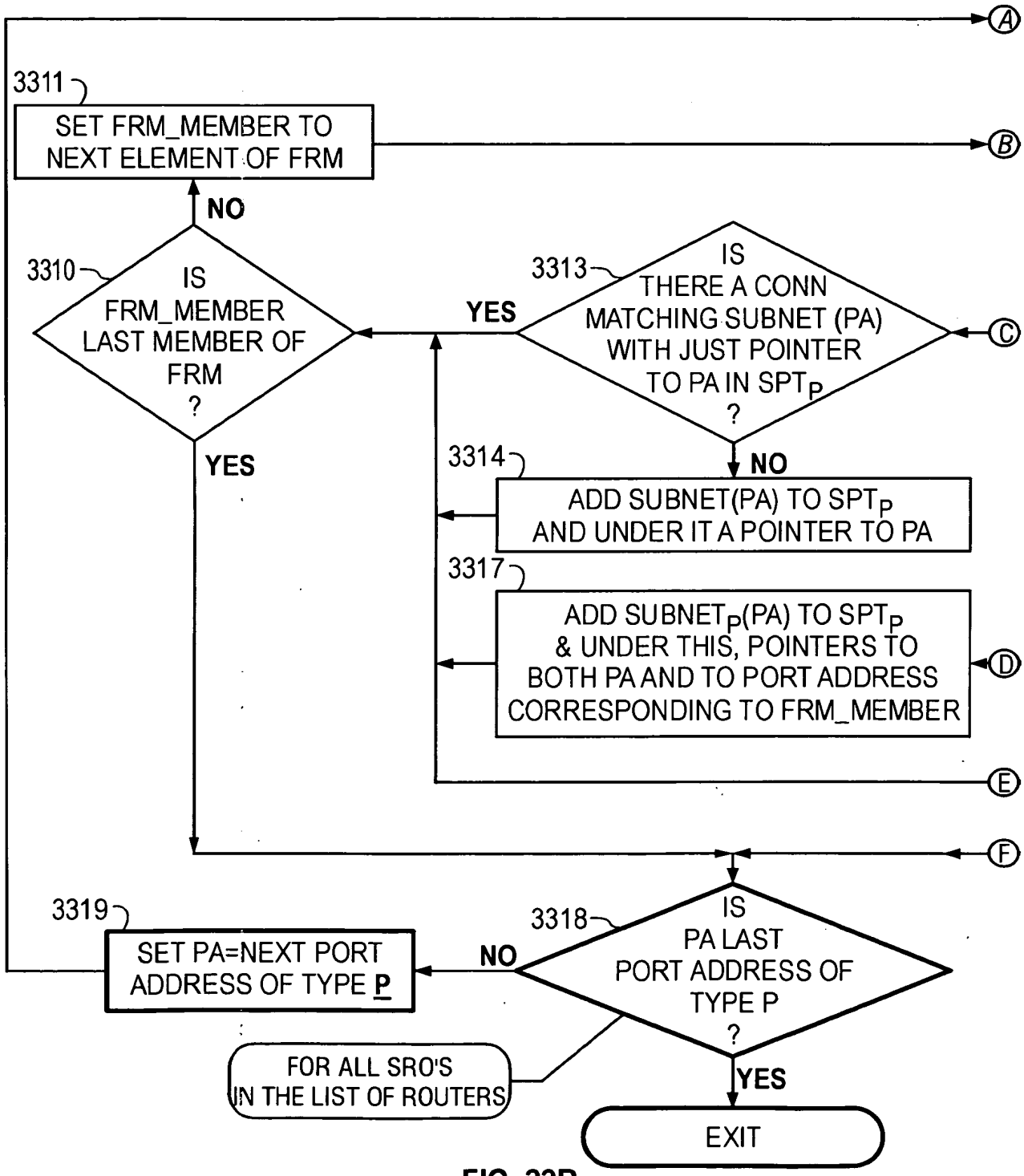

A
3311
SET FRM_MEMBER TO NEXT ELEMENT OF FRM
B
NO
3310
IS FRM_MEMBER LAST MEMBER OF FRM ?
YES
3313
IS THERE A CONN MATCHING SUBNET (PA) WITH JUST POINTER TO PA IN SPTP ?
C
YES
NO
3314
ADD SUBNET(PA) TO SPTP AND UNDER IT A POINTER TO PA
3317
ADD SUBNETP(PA) TO SPTP & UNDER THIS, POINTERS TO BOTH PA AND TO PORT ADDRESS CORRESPONDING TO FRM_MEMBER
D
E
F
3319
SET PA=NEXT PORT ADDRESS OF TYPE P
NO
3318
IS PA LAST PORT ADDRESS OF TYPE P ?
FOR ALL SRO'S IN THE LIST OF ROUTERS
YES
EXIT

FIG. 33B

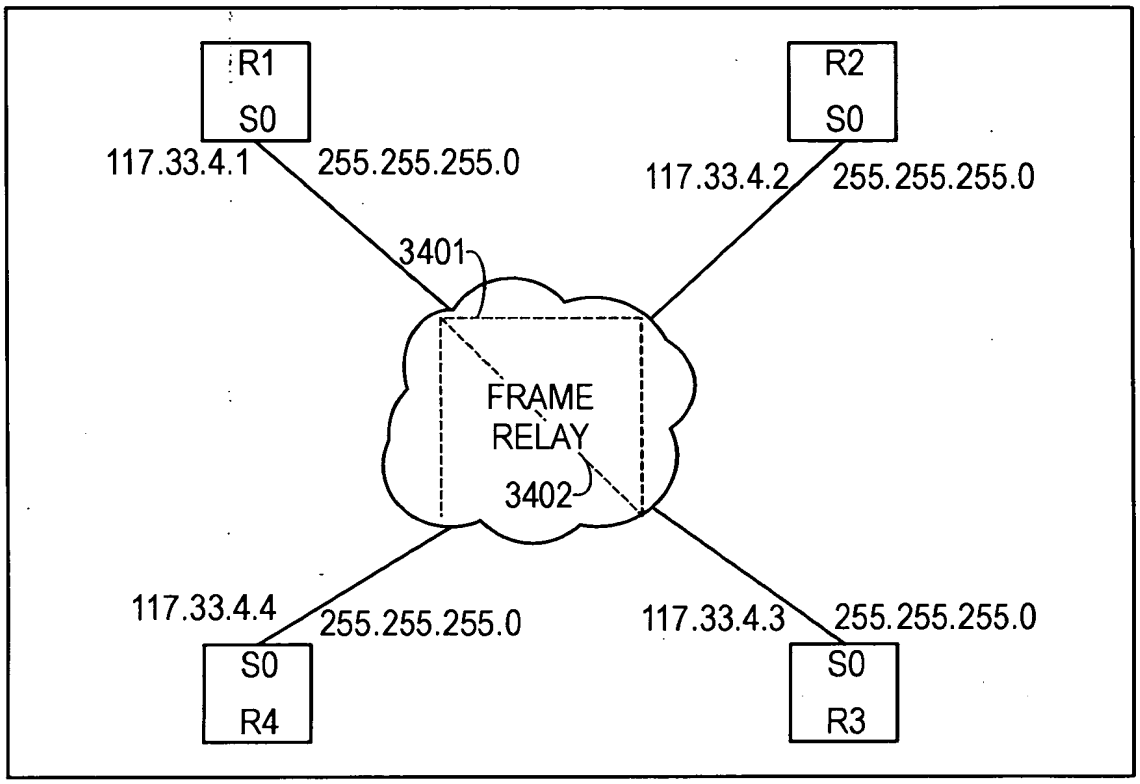


FIG. 34

NOTE TO FIGURE 34

THE NOTION OF A FRAME RELAY CLOUD IMPLIES FULLY MESHED CONNECTIVITY, YET IN ACTUALITY CONNECTIVITY MAY BE LIMITED AS SHOWN WITH DOTTED LINES INSIDE CLOUD

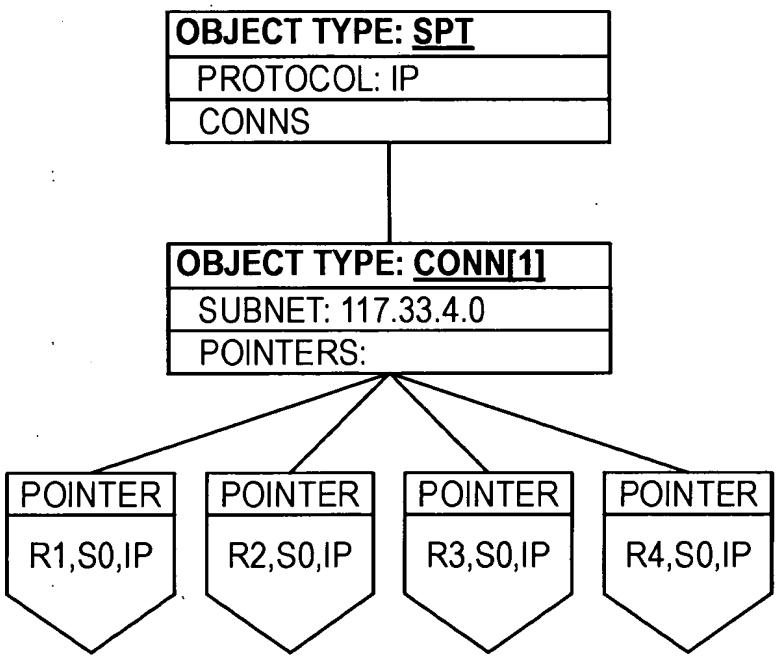


FIG. 35

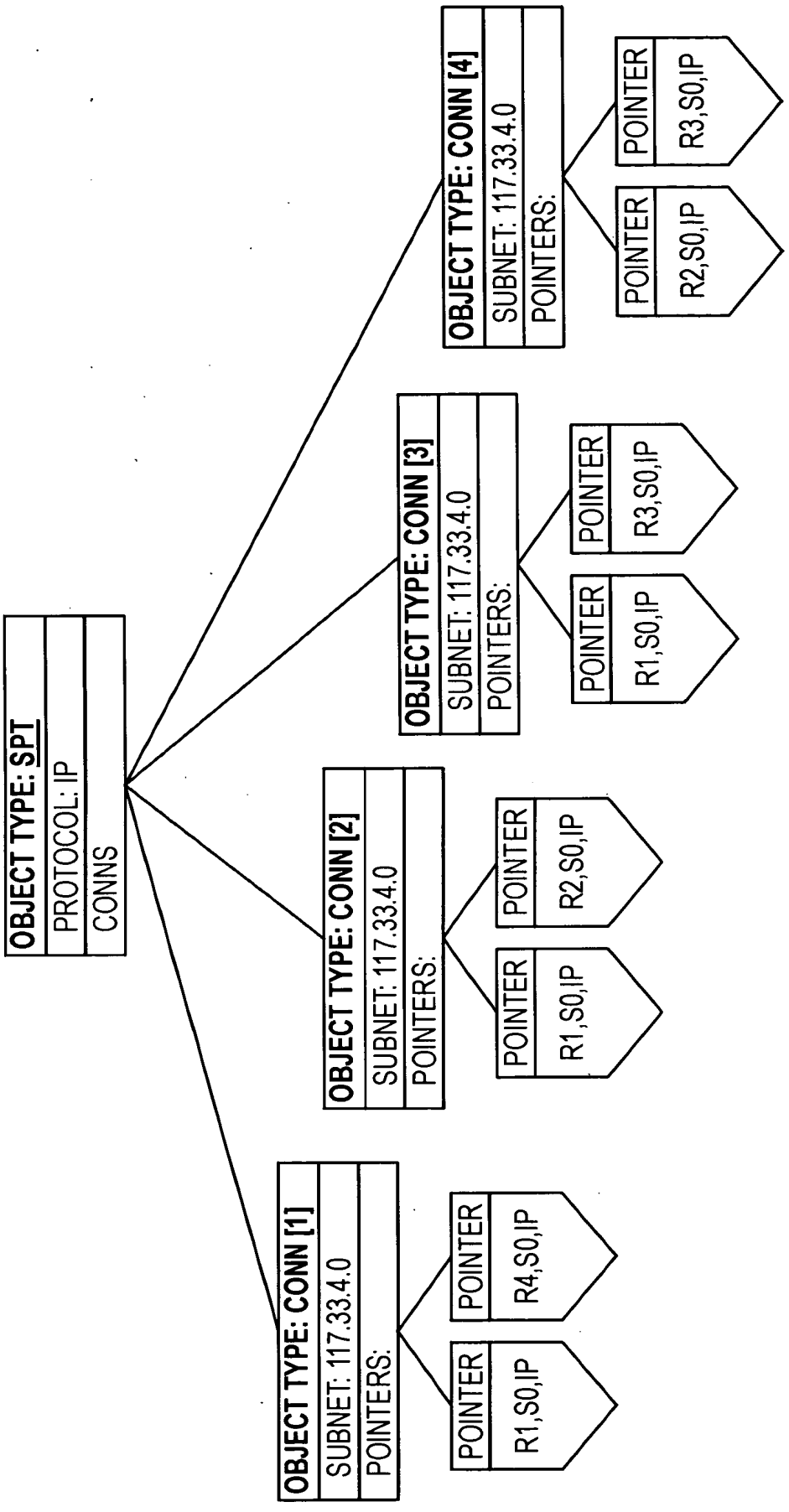


FIG. 36

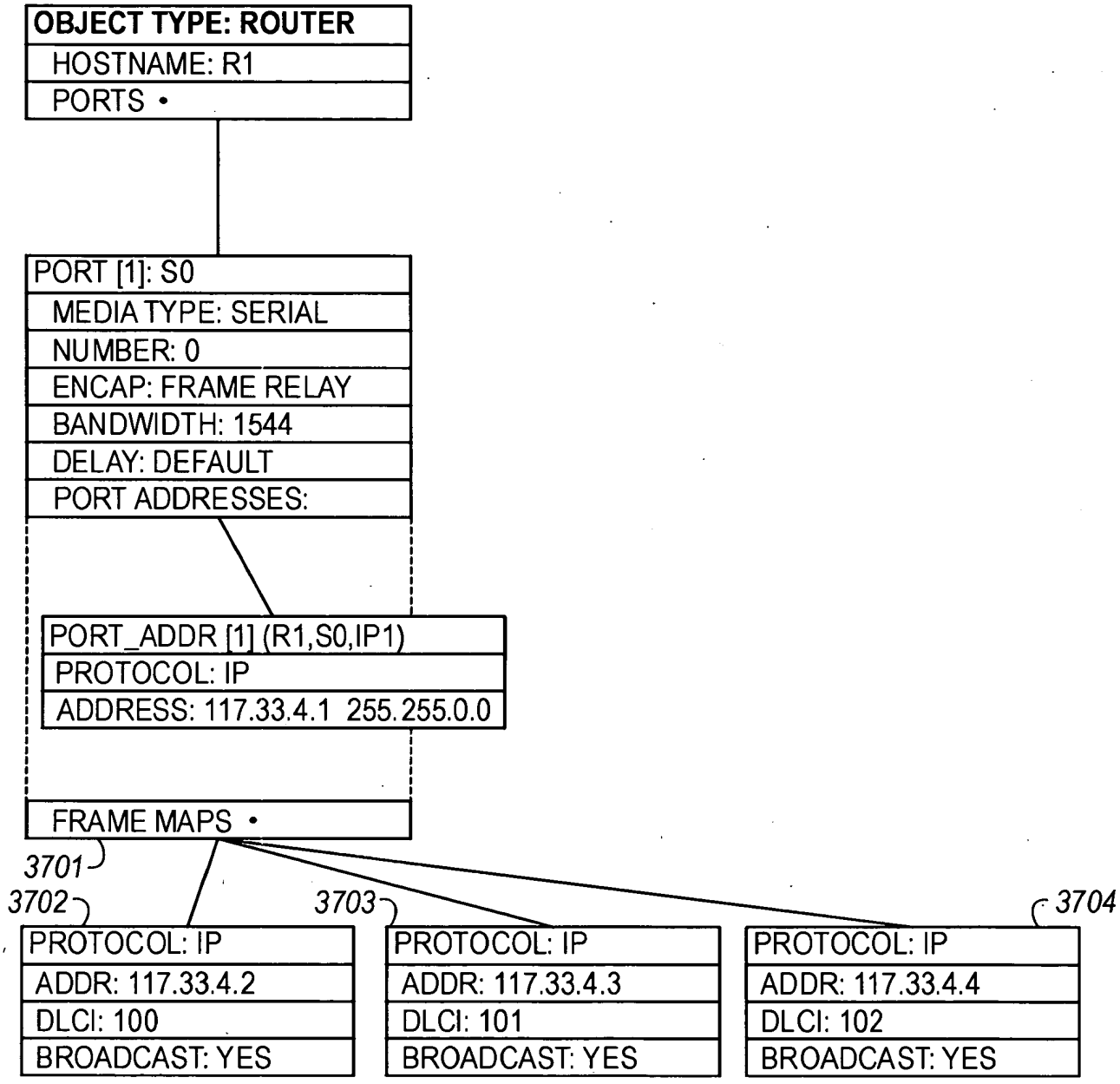


FIG. 37

3801

```
VERSION 10.0
!
HOSTNAME R1
!
IP SUBNET-ZERO
!
INTERFACE SERIAL0
DESCRIPTION SERIAL 0
ENCAPSULATION FRAME-RELAY
IP ADDRESS 117.33.4.1  255.255.0.0
FRAME RELAY MAP IP 117.33.4.2 100 BROADCAST
FRAME RELAY MAP IP 117.33.4.3 101 BROADCAST
FRAME RELAY MAP IP 117.33.4.4 102 BROADCAST
!
ROUTER RIP 109
NETWORK 117.33.0.0
END
```

FIG. 38A

3803

```
VERSION 10.0
!
HOSTNAME R2
!
IP SUBNET-ZERO
!
INTERFACE SERIAL0
DESCRIPTION SERIAL 0
ENCAPSULATION FRAME-RELAY
IP ADDRESS 117.33.4.1  255.255.0.0
FRAME RELAY MAP IP 117.33.4.1 100 BROADCAST
FRAME RELAY MAP IP 117.33.4.3 101 BROADCAST
!
ROUTER RIP 109
NETWORK 117.33.0.0
END
```

FIG. 38B

```
VERSION 10.0
!
HOSTNAME R3
!
IP SUBNET-ZERO
!
INTERFACE SERIAL0
DESCRIPTION SERIAL 0
ENCAPSULATION FRAME-RELAY
IP ADDRESS 117.33.4.1  255.255.0.0
FRAME RELAY MAP IP 117.33.4.1 100 BROADCAST
FRAME RELAY MAP IP 117.33.4.2 101 BROADCAST
!
ROUTER RIP 109
NETWORK 117.33.0.0
END
```

FIG. 38C

```
VERSION 10.0
!
HOSTNAME R4
!
IP SUBNET-ZERO
!
INTERFACE SERIAL0
DESCRIPTION SERIAL 0
ENCAPSULATION FRAME-RELAY
IP ADDRESS 117.33.4.1  255.255.0.0
FRAME RELAY MAP IP 117.33.4.1 100 BROADCAST
!
ROUTER RIP 109
NETWORK 117.33.0.0
END
```

FIG. 38D

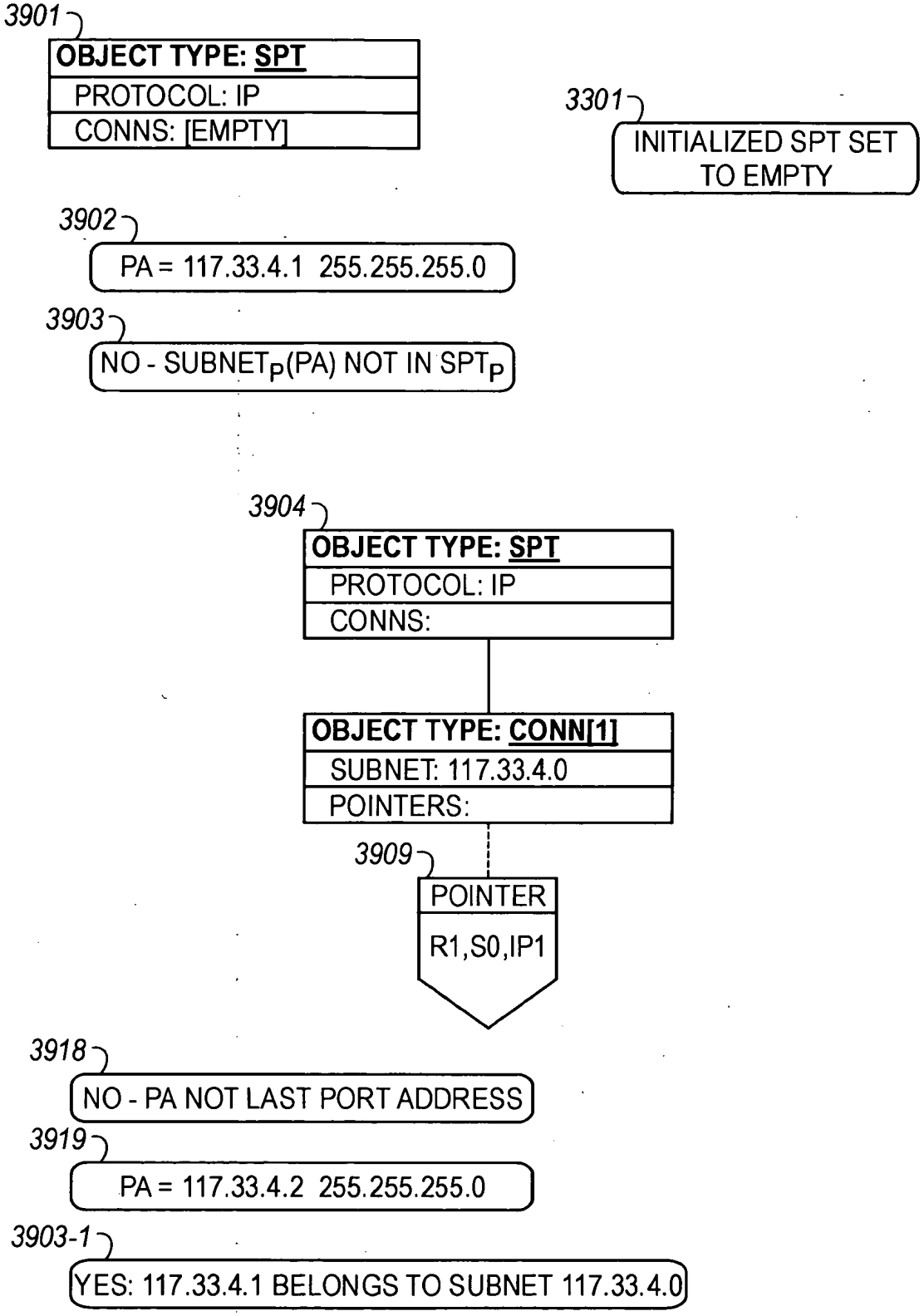


FIG. 39A

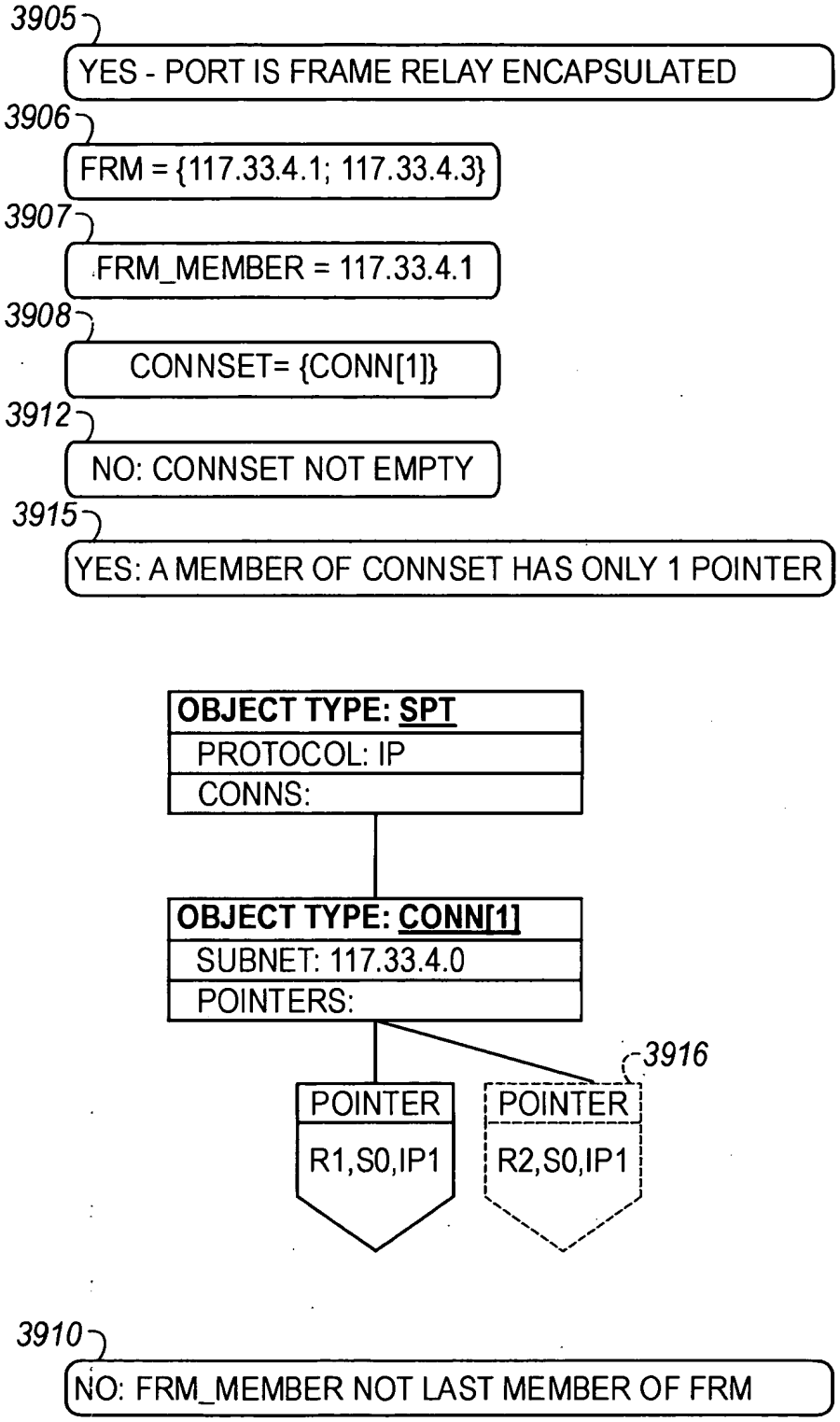


FIG. 39B

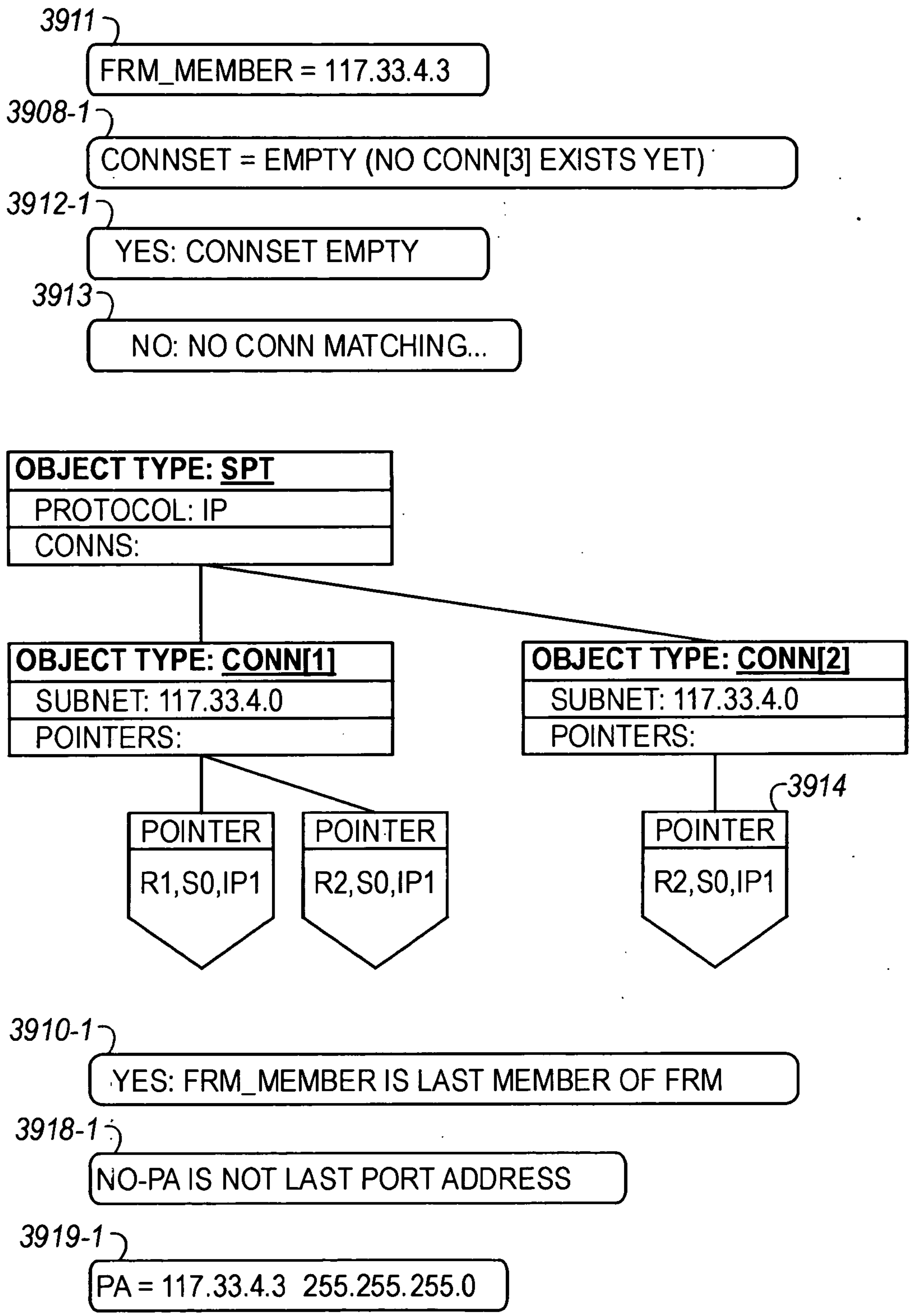


FIG. 39C

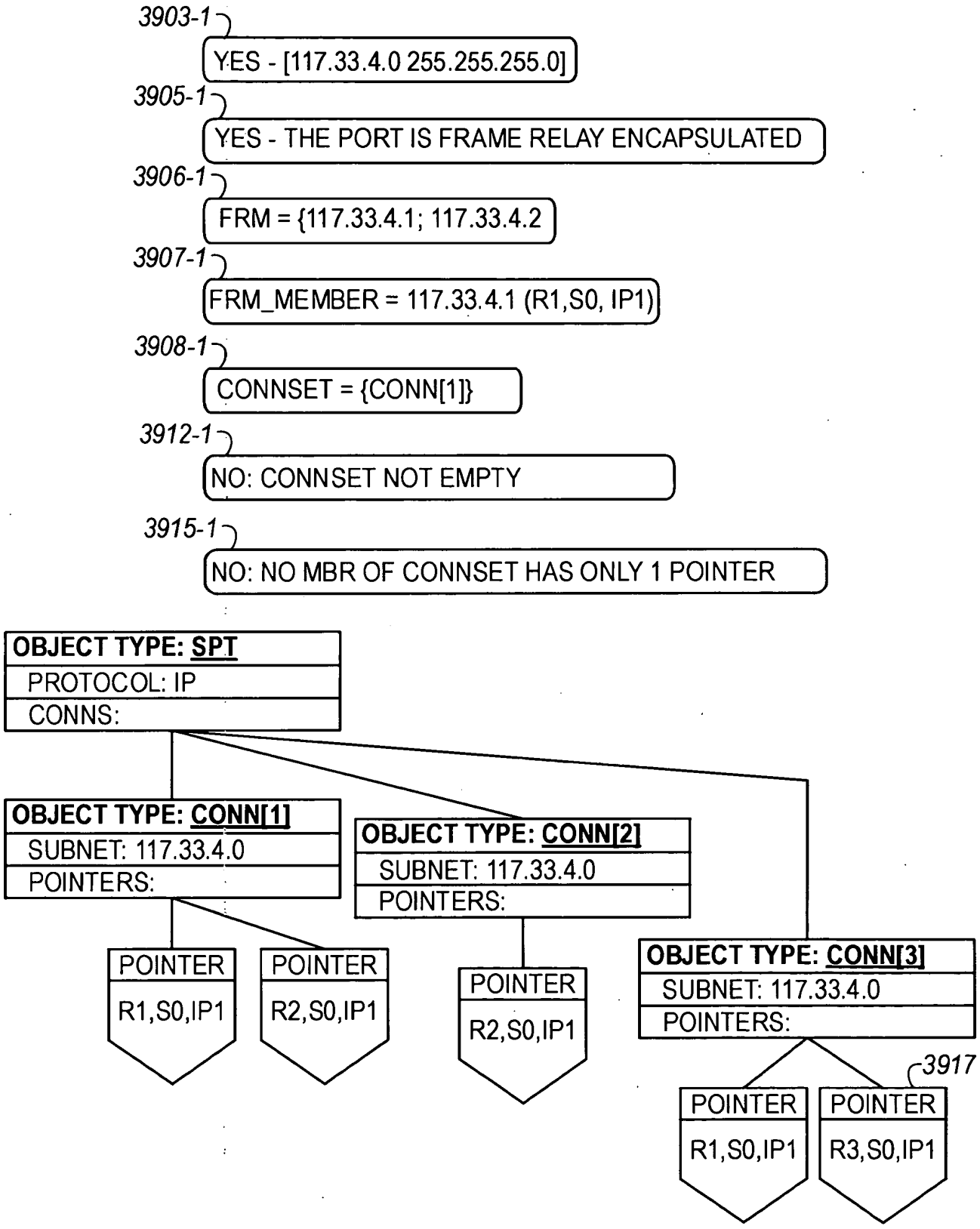


FIG. 39D

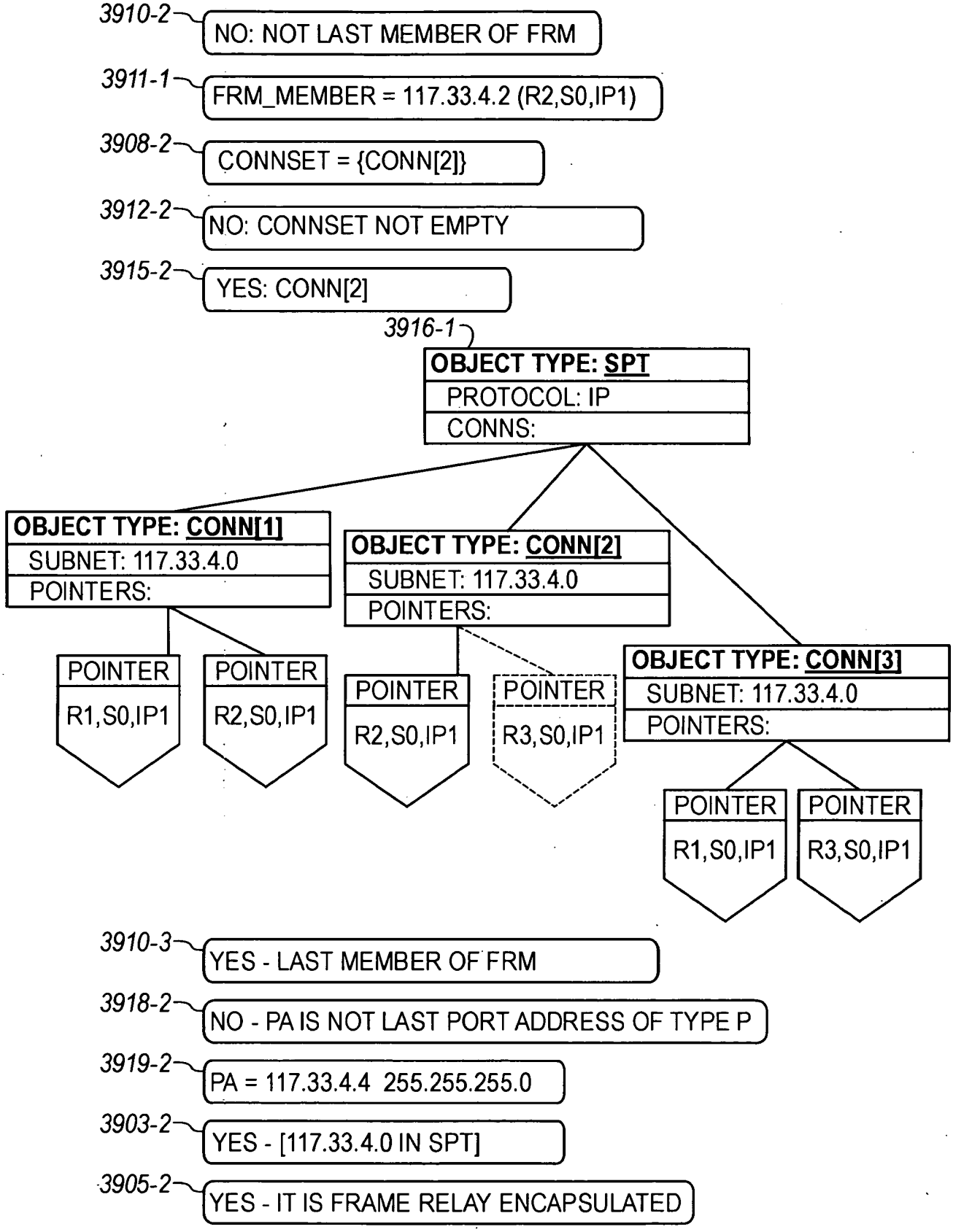


FIG. 39E

Title: Method of Resolving Conflicts in Access Control Lists...
Inventor(s): R. N. Pelavin, et al.
Express Mail Label No. EL652871260U ket No. 50325-0630

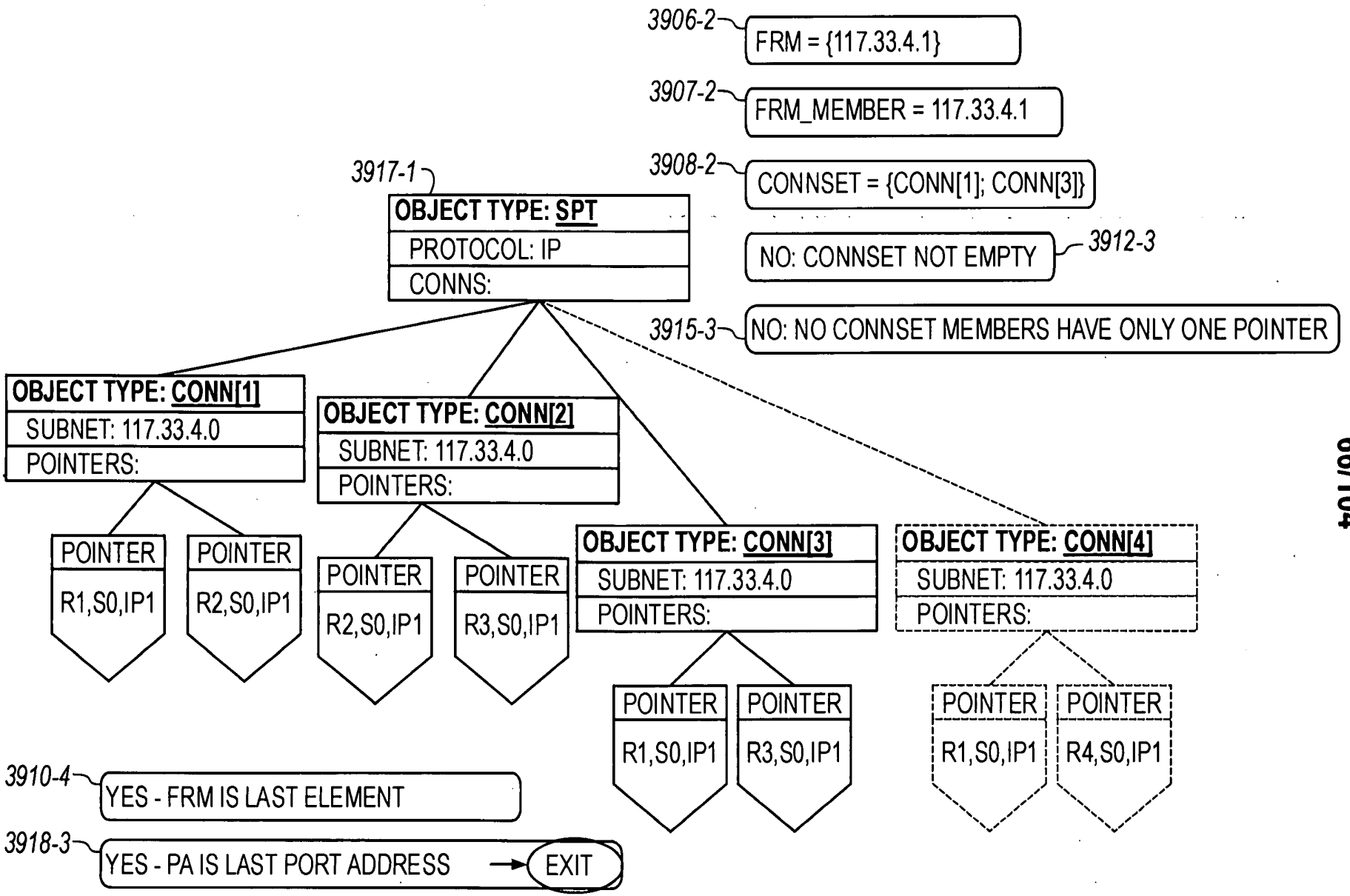


FIG. 39F

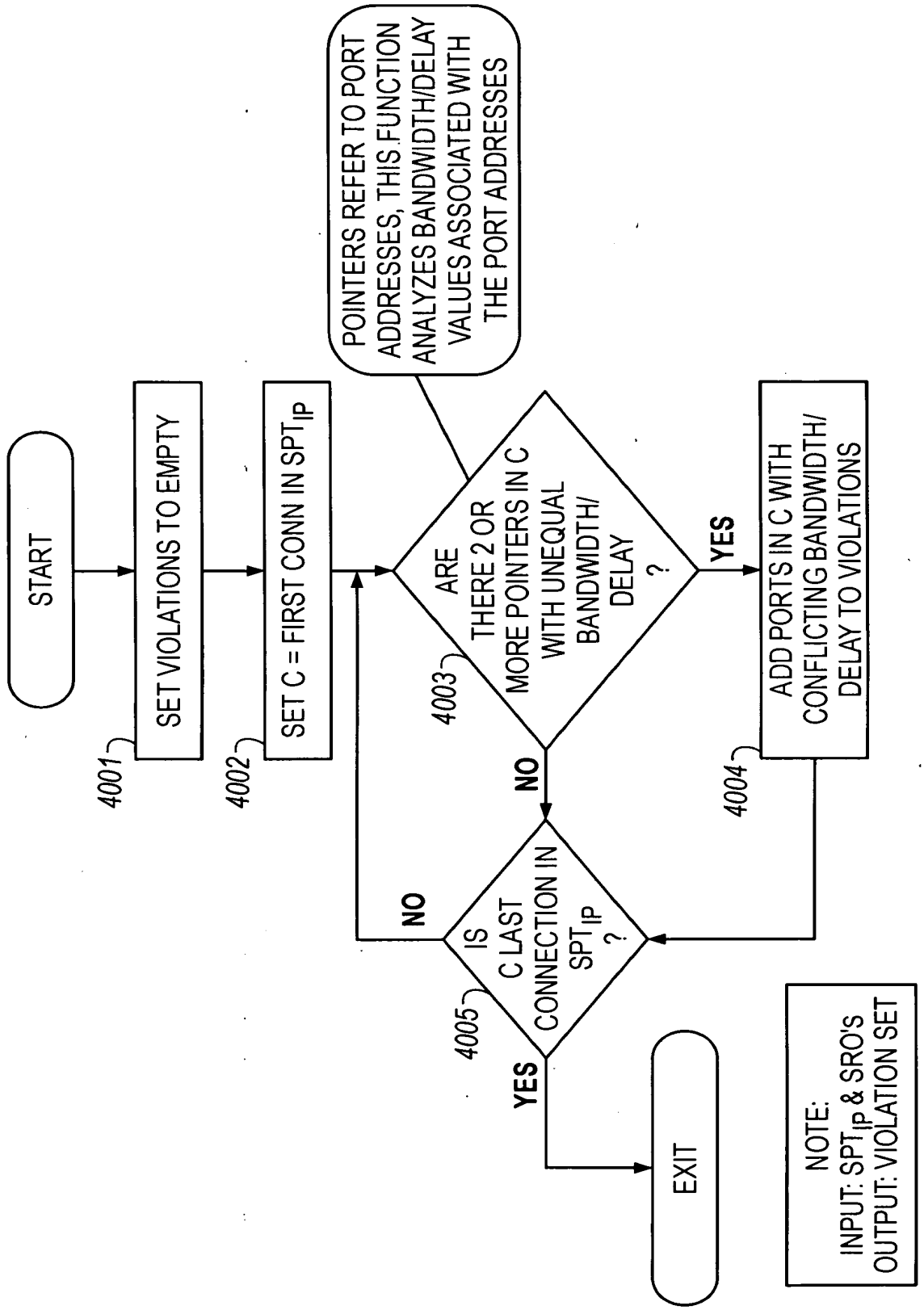


FIG. 40

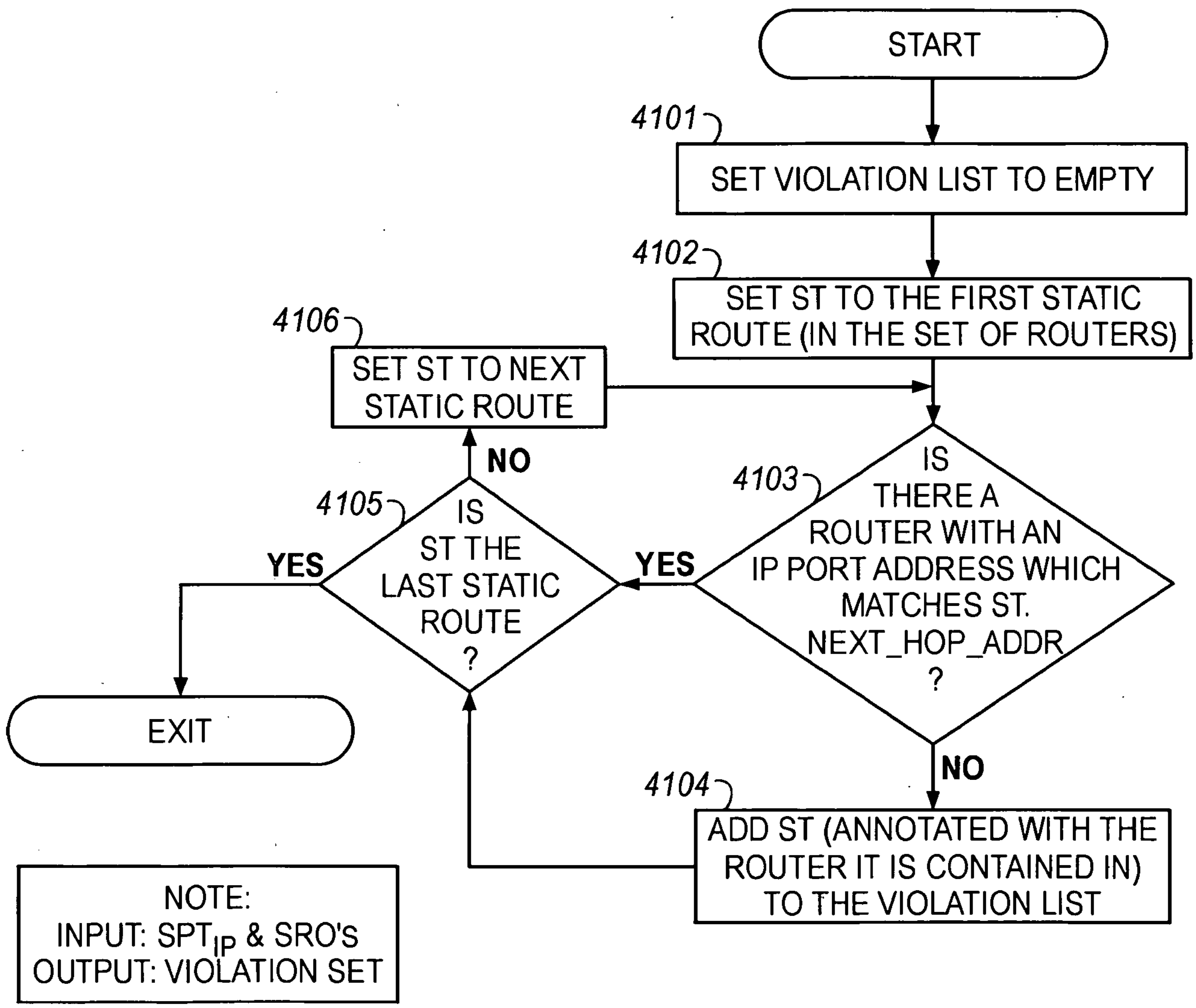


FIG. 41

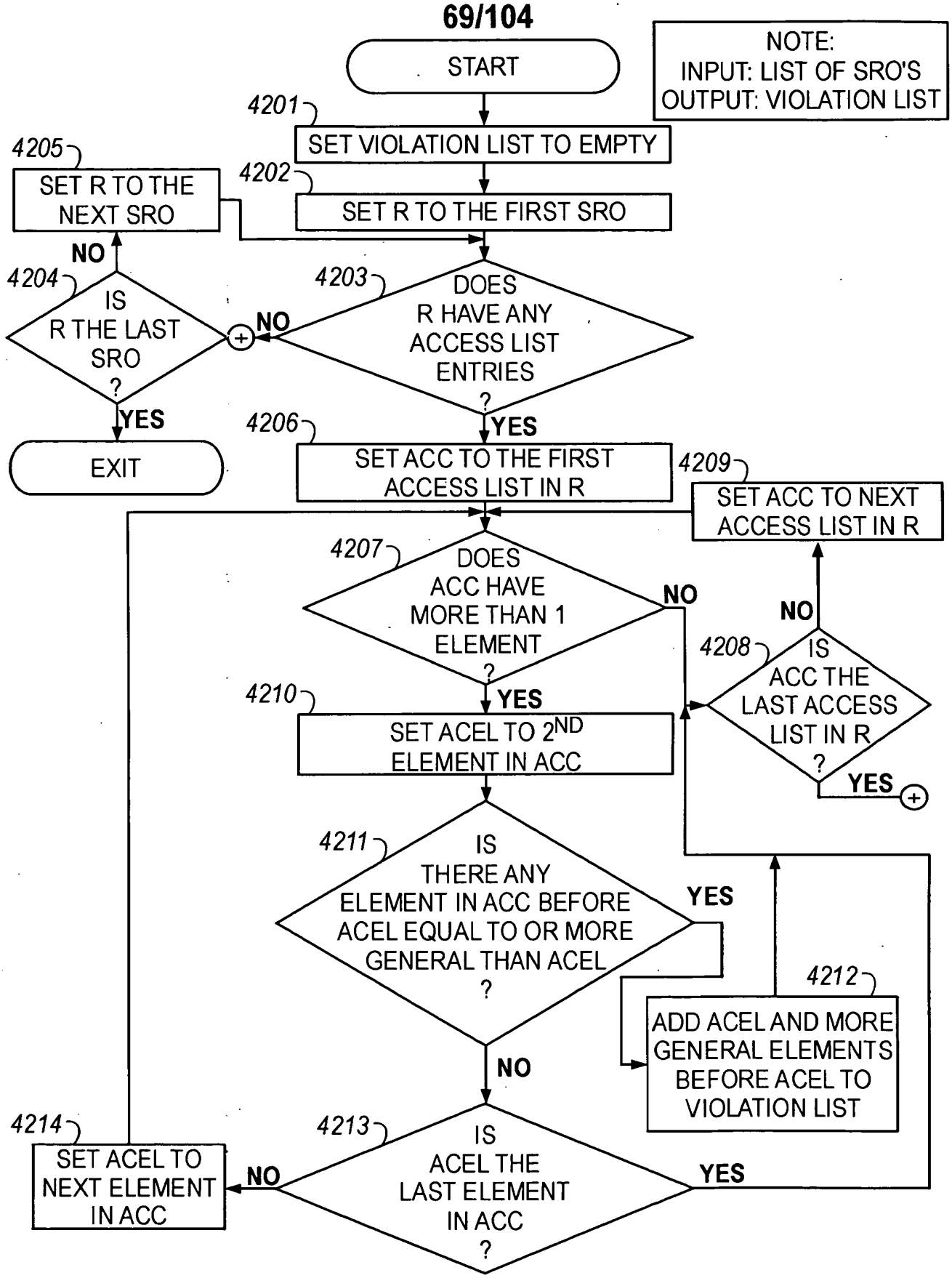


FIG. 42

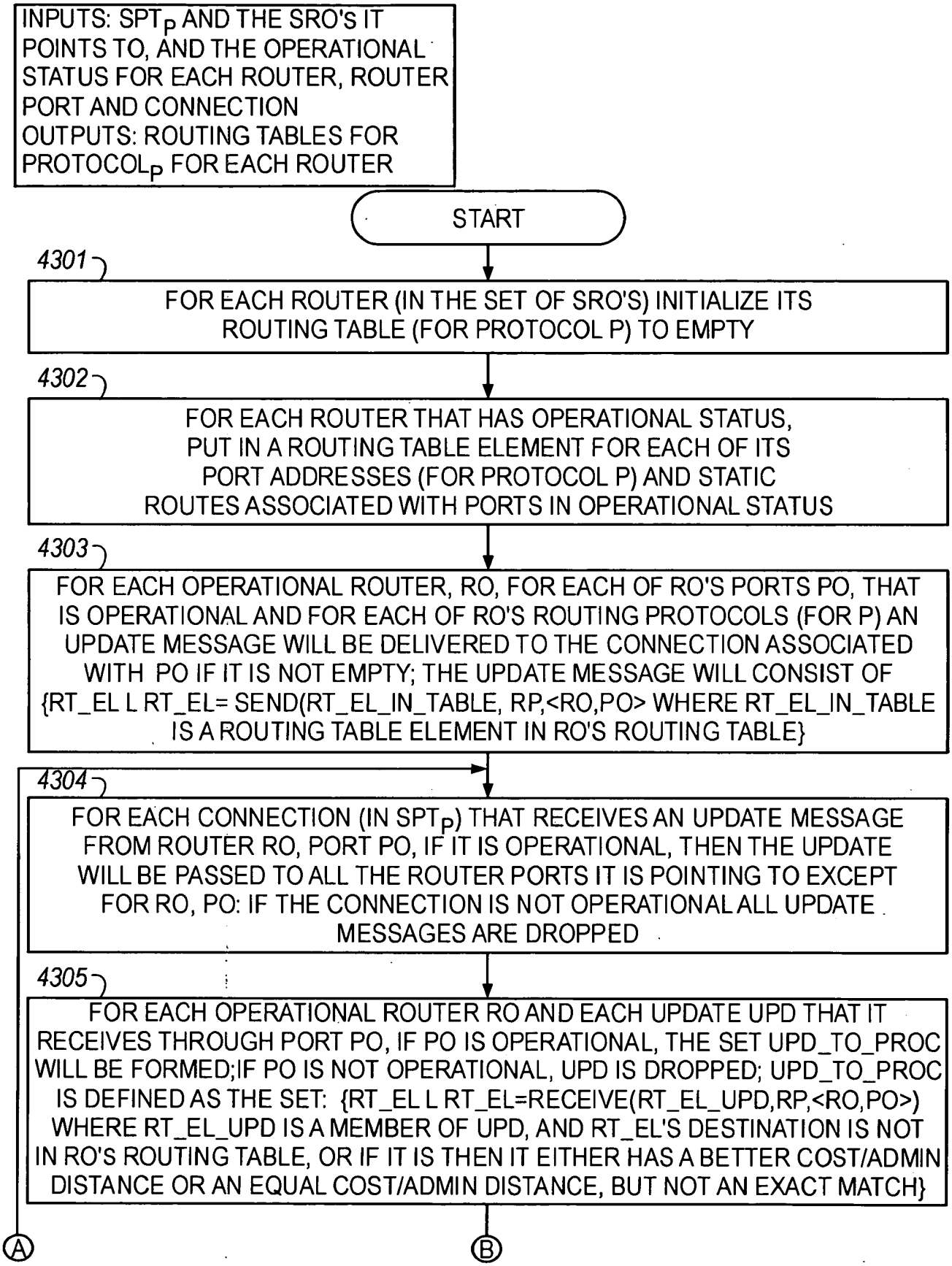


FIG. 43A

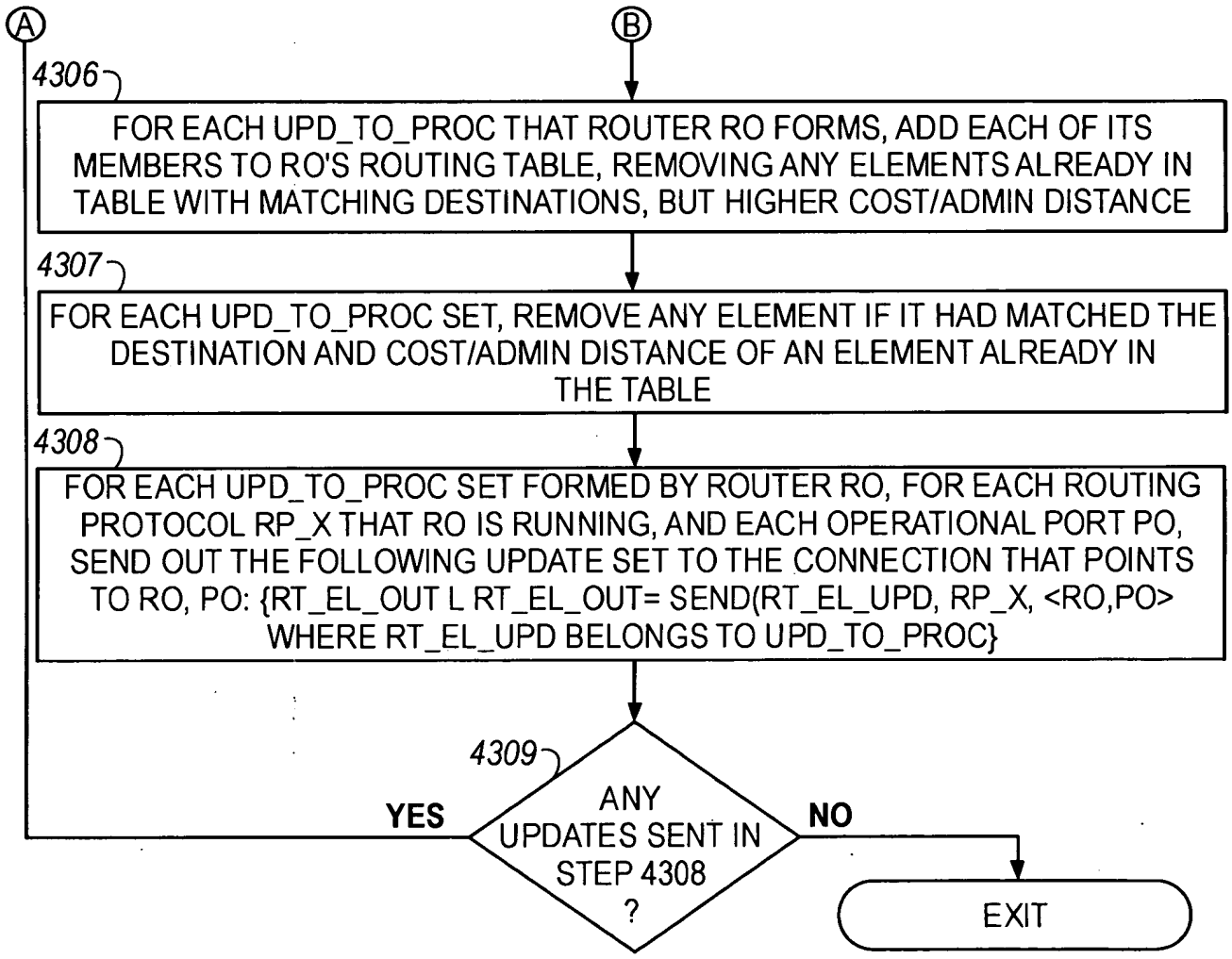

A
B
4306
FOR EACH UPD_TO_PROC THAT ROUTER RO FORMS, ADD EACH OF ITS MEMBERS TO RO'S ROUTING TABLE, REMOVING ANY ELEMENTS ALREADY IN TABLE WITH MATCHING DESTINATIONS, BUT HIGHER COST/ADMIN DISTANCE
4307
FOR EACH UPD_TO_PROC SET, REMOVE ANY ELEMENT IF IT HAD MATCHED THE DESTINATION AND COST/ADMIN DISTANCE OF AN ELEMENT ALREADY IN THE TABLE
4308
FOR EACH UPD_TO_PROC SET FORMED BY ROUTER RO, FOR EACH ROUTING PROTOCOL RP_X THAT RO IS RUNNING, AND EACH OPERATIONAL PORT PO, SEND OUT THE FOLLOWING UPDATE SET TO THE CONNECTION THAT POINTS TO RO, PO: {RT_EL_OUT L RT_EL_OUT= SEND(RT_EL_UPD, RP_X, <RO,PO> WHERE RT_EL_UPD BELONGS TO UPD_TO_PROC}
4309
ANY UPDATES SENT IN STEP 4308 ?
YES
NO
EXIT

FIG. 43B

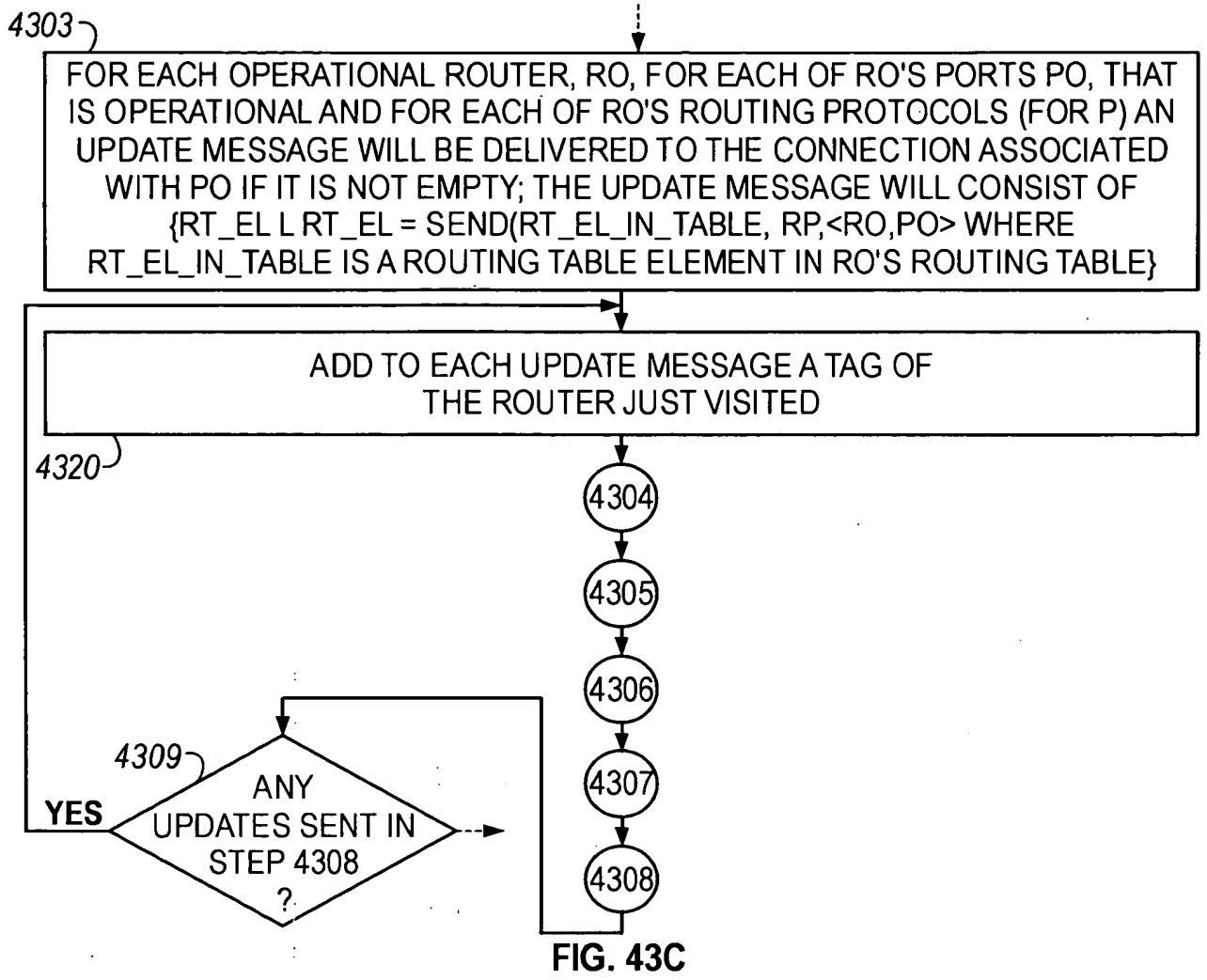


FIG. 43C

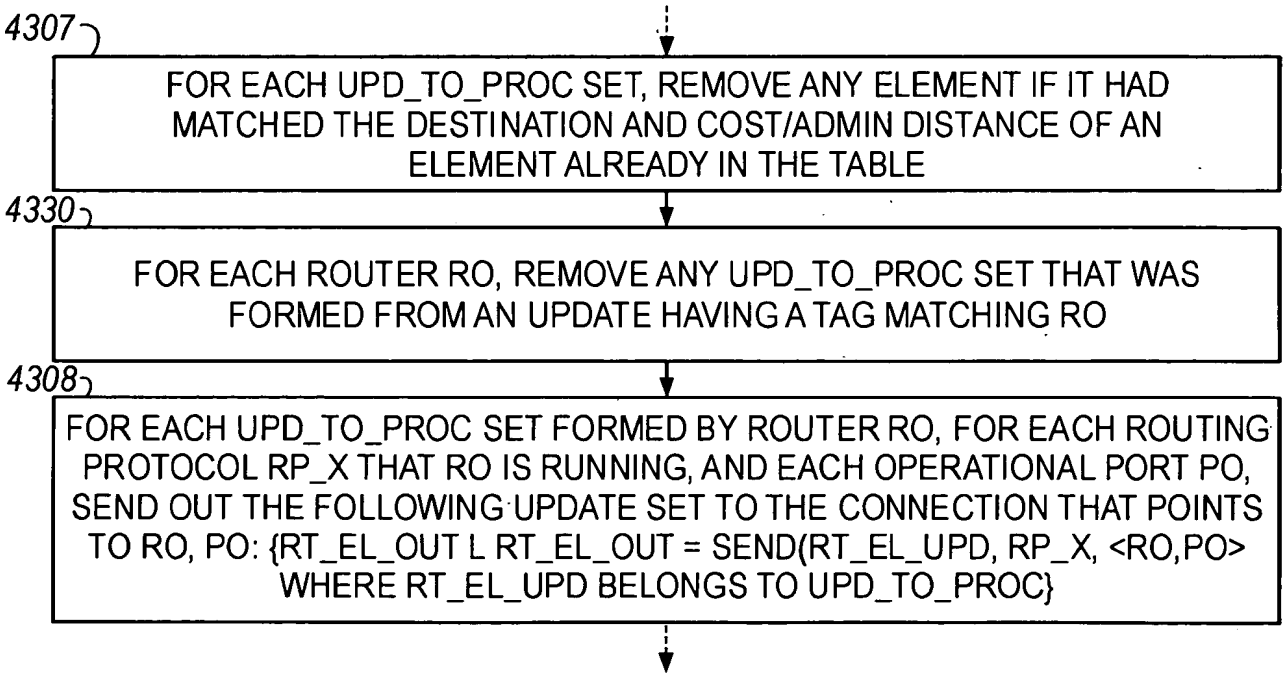


FIG. 43D

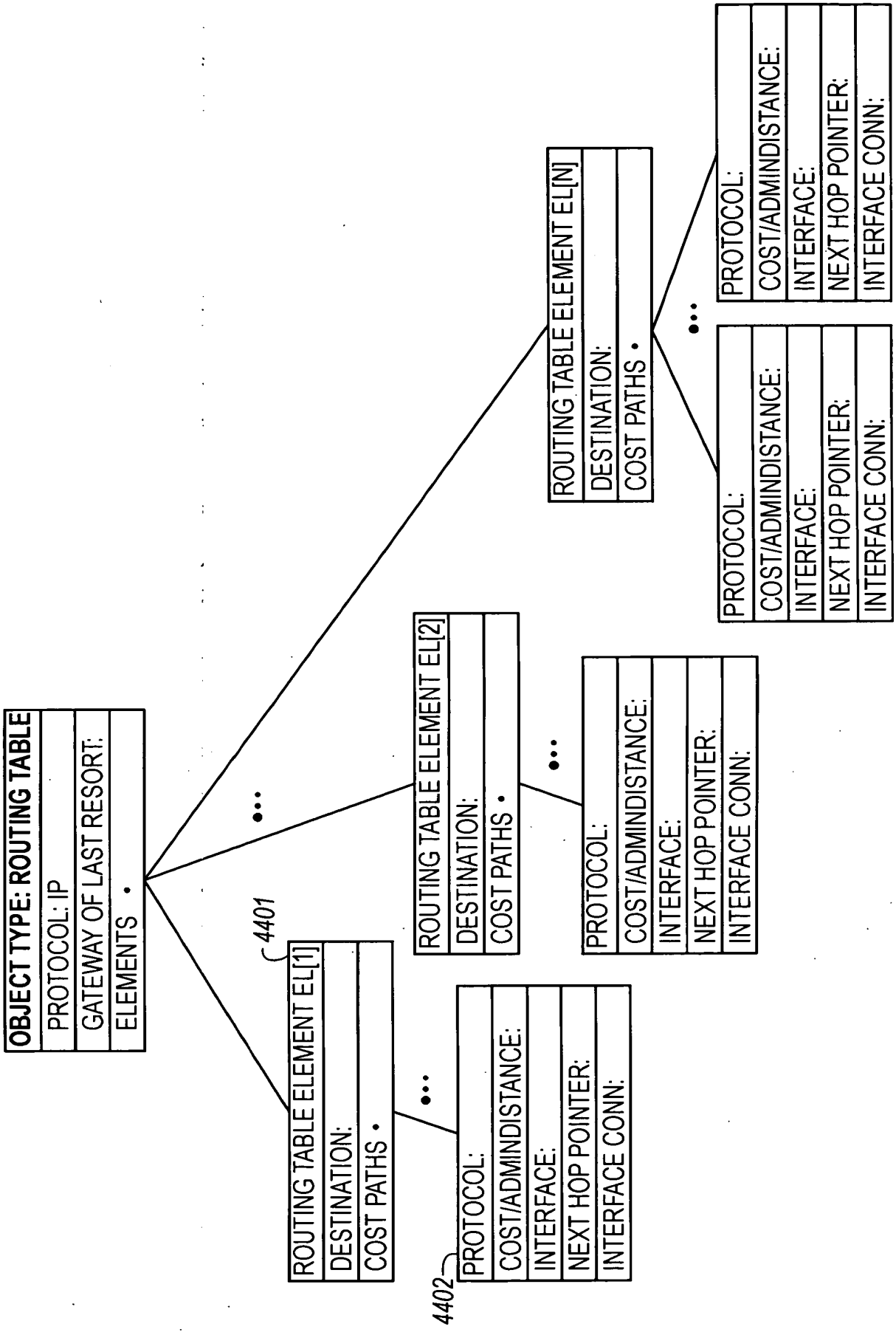
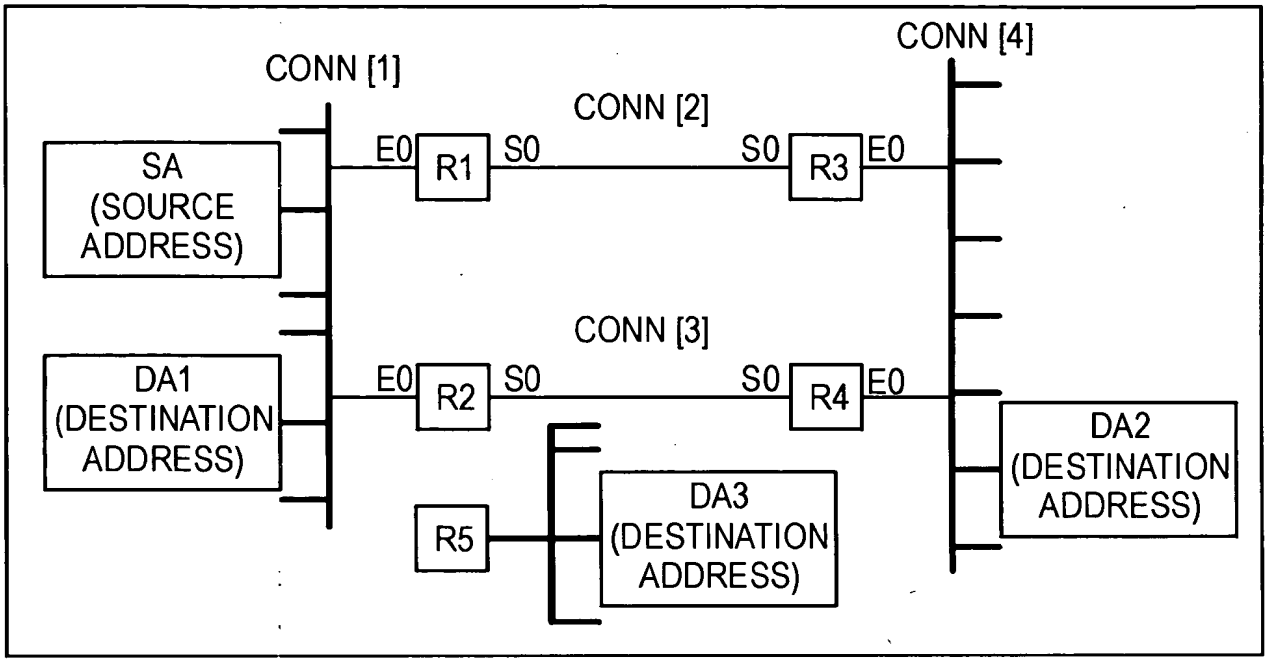

OBJECT TYPE: ROUTING TABLE
PROTOCOL: IP
GATEWAY OF LAST RESORT:
ELEMENTS •
4401
ROUTING TABLE ELEMENT EL[1]
DESTINATION:
COST PATHS •
4402
PROTOCOL:
COST/ADMINDISTANCE:
INTERFACE:
NEXT HOP POINTER:
INTERFACE CONN:
ROUTING TABLE ELEMENT EL[2]
DESTINATION:
COST PATHS •
PROTOCOL:
COST/ADMINDISTANCE:
INTERFACE:
NEXT HOP POINTER:
INTERFACE CONN:
ROUTING TABLE ELEMENT EL[N]
DESTINATION:
COST PATHS •
PROTOCOL:
COST/ADMINDISTANCE:
INTERFACE:
NEXT HOP POINTER:
INTERFACE CONN:
PROTOCOL:
COST/ADMINDISTANCE:
INTERFACE:
NEXT HOP POINTER:
INTERFACE CONN:

FIG. 44



DATA LABELS USED IN CPS DISCUSSION

SC	**S**OURCE **C**ONNECTION
DC	**D**ESTINATION **C**ONNECTION
SA	**S**OURCE **A**DDRESS
DA	**D**ESTINATION **A**DDRESS
CPS	**C**OMPLETED **P**ATH **S**ET
APS	**A**CTIVE **P**ATH **S**ET
SPT	**S**INGLE **P**ROTOCOL **T**OPOLOGY
CR	**C**URRENT **R**OUTER
NC	**N**EW **C**ONNECTION
EL	**E**LEMENT
P	**P**ROTOCOL
CPO	**C**OST **P**ATH **O**BJECT

DEFINITION: COMPLETED PATH SET - CPS

THE SET HAVING: NO ELEMENTS; 1 ELEMENT; OR, MORE THAN 1 ELEMENT

NO ELEMENTS MEANS: NO PATH FROM SA TO DA
ONE (1) ELEMENT MEANS: ONE PATH FROM SA TO DA
MORE THAN ONE ELEMENT: MULTIPLE PATHS FROM SA TO DA

THE CPS FOR SA TO DA2 LOOKS LIKE:
{[SA;CONN[1];R1;CONN[2];R3;CONN[4];DA2]
[SA;CONN[1];R2;CONN[3];R4;CONN[4]DA2]}

THE CPS FOR SA TO DA1 LOOKS LIKE:
{[SA;CONN[1];DA1]}

THE CPS FOR SA TO DA3 LOOKS LIKE:
{}

FIG. 45

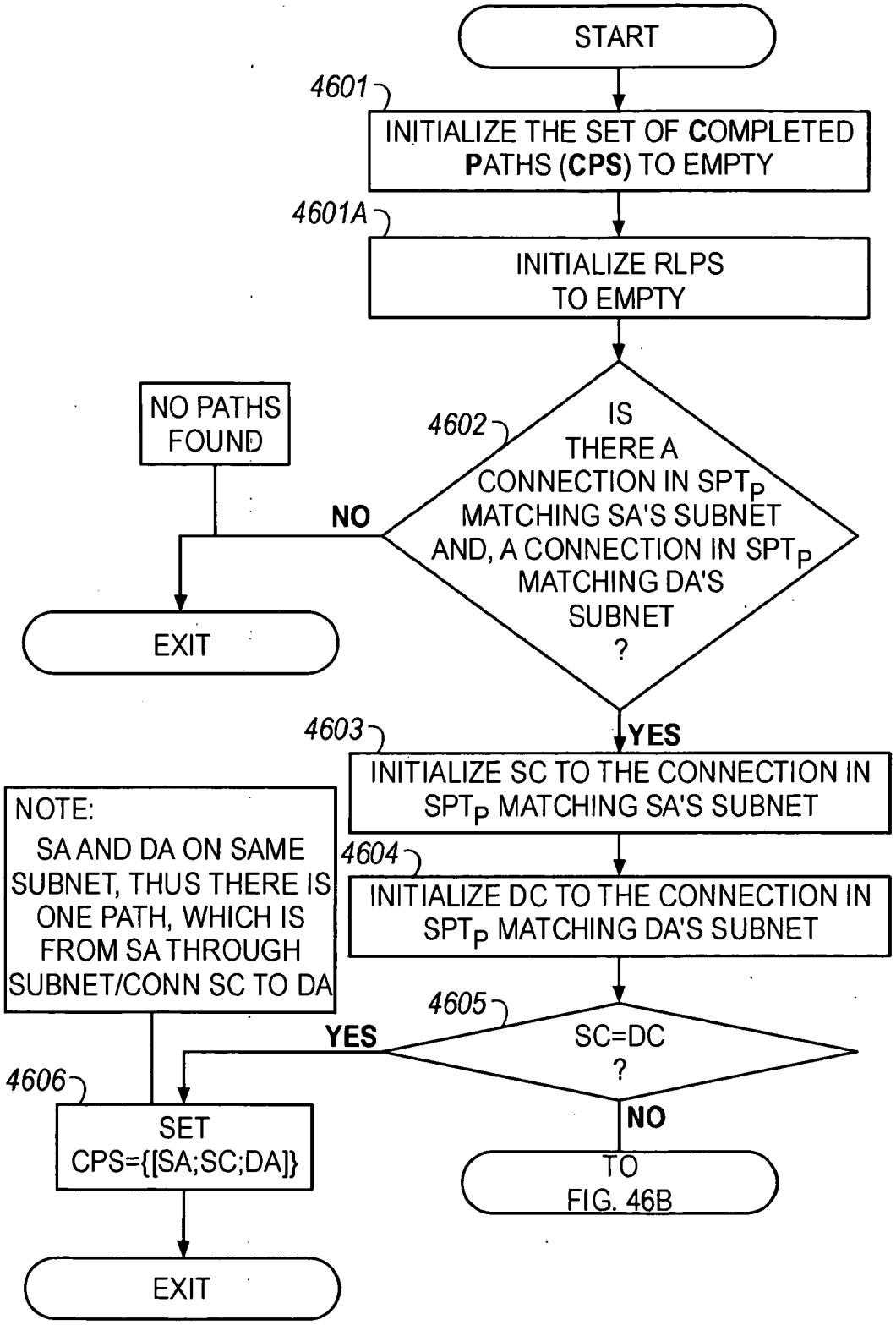

START
4601
INITIALIZE THE SET OF COMPLETED PATHS (CPS) TO EMPTY
4601A
INITIALIZE RLPS TO EMPTY
4602
IS THERE A CONNECTION IN SPT$_P$ MATCHING SA'S SUBNET AND, A CONNECTION IN SPT$_P$ MATCHING DA'S SUBNET ?
NO
NO PATHS FOUND
EXIT
YES
4603
INITIALIZE SC TO THE CONNECTION IN SPT$_P$ MATCHING SA'S SUBNET
4604
INITIALIZE DC TO THE CONNECTION IN SPT$_P$ MATCHING DA'S SUBNET
4605
SC=DC ?
YES
NO
NOTE:
SA AND DA ON SAME SUBNET, THUS THERE IS ONE PATH, WHICH IS FROM SA THROUGH SUBNET/CONN SC TO DA
4606
SET CPS={[SA;SC;DA]}
EXIT
TO FIG. 46B

FIG. 46A

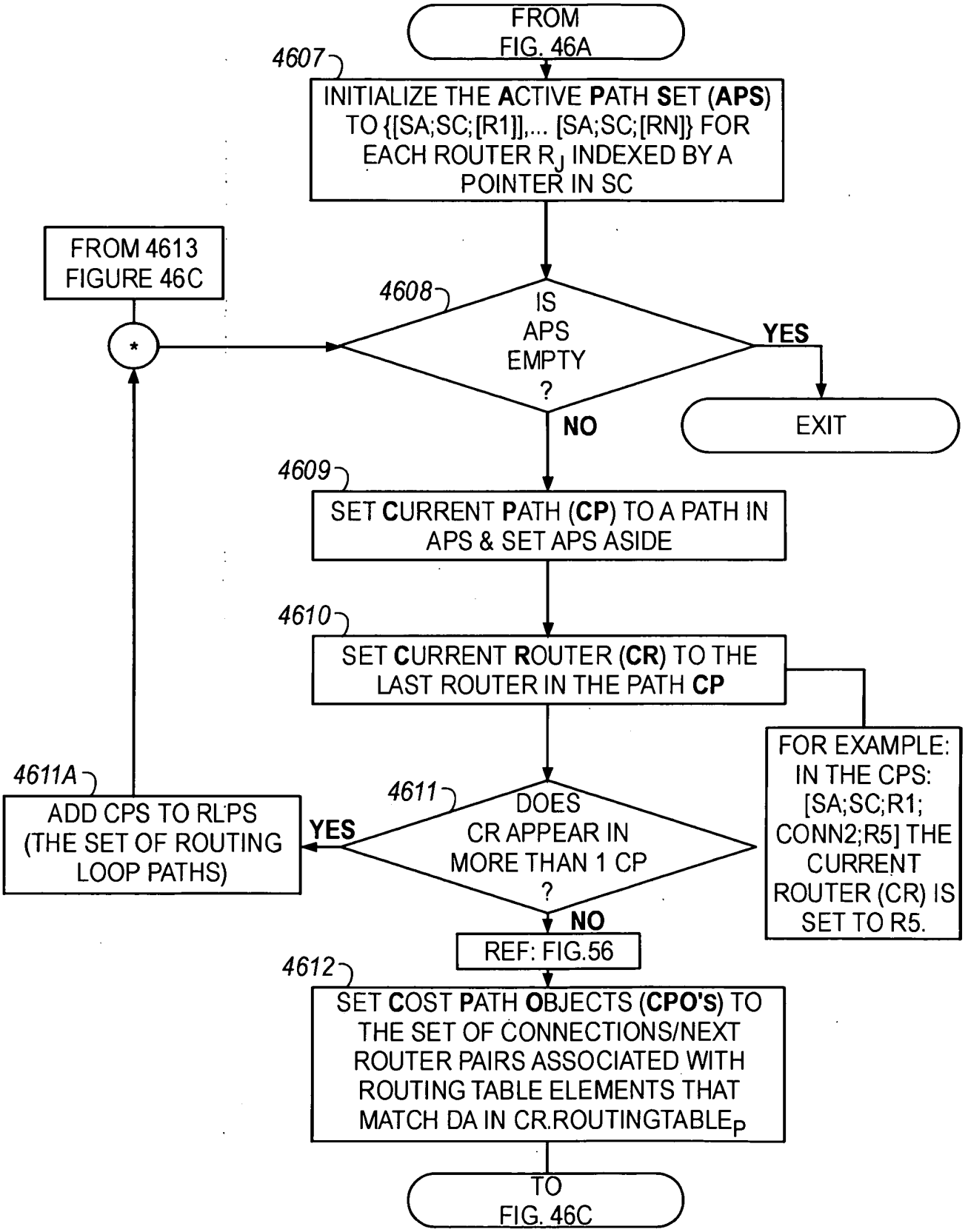


FIG. 46B

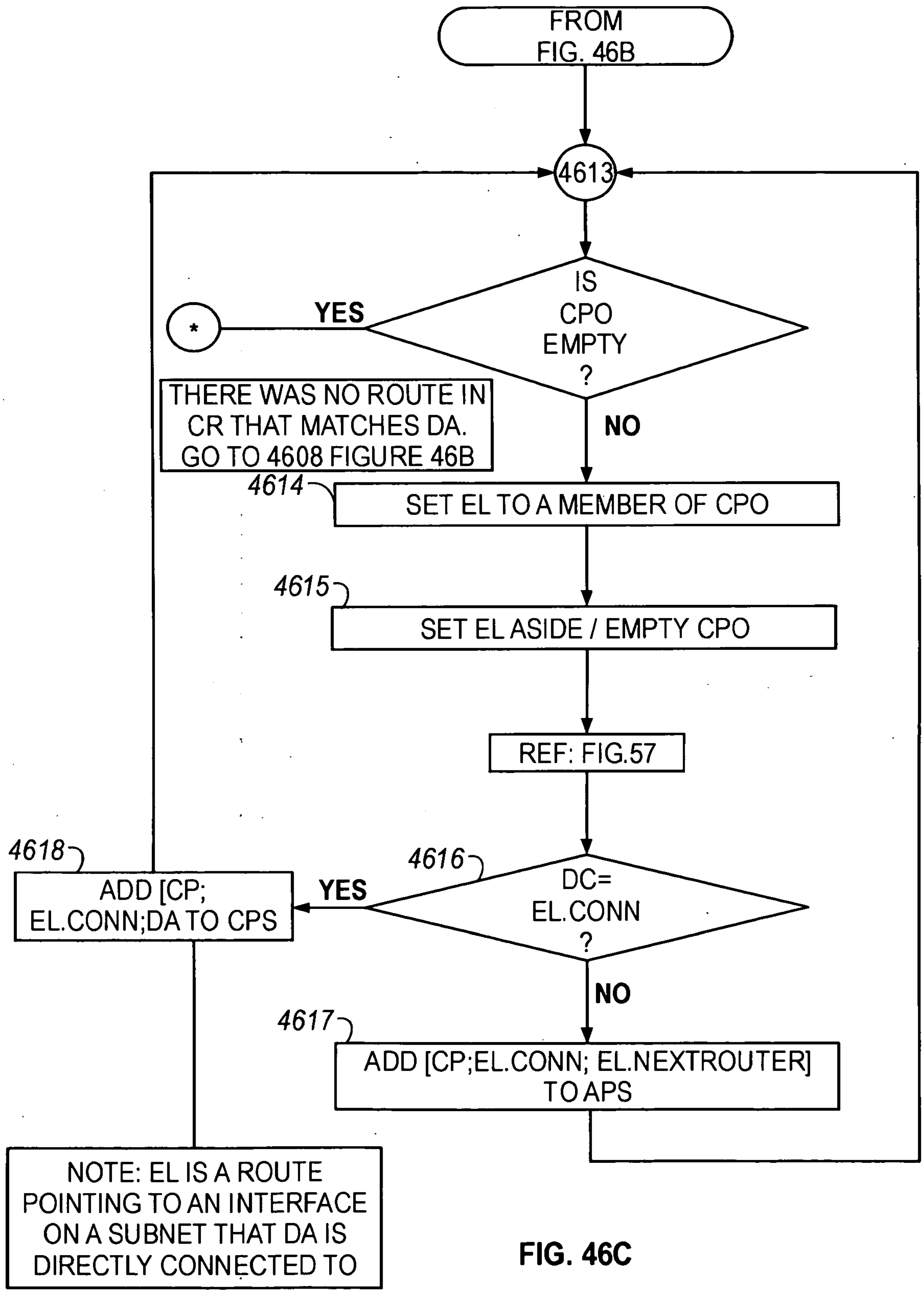


FIG. 46C

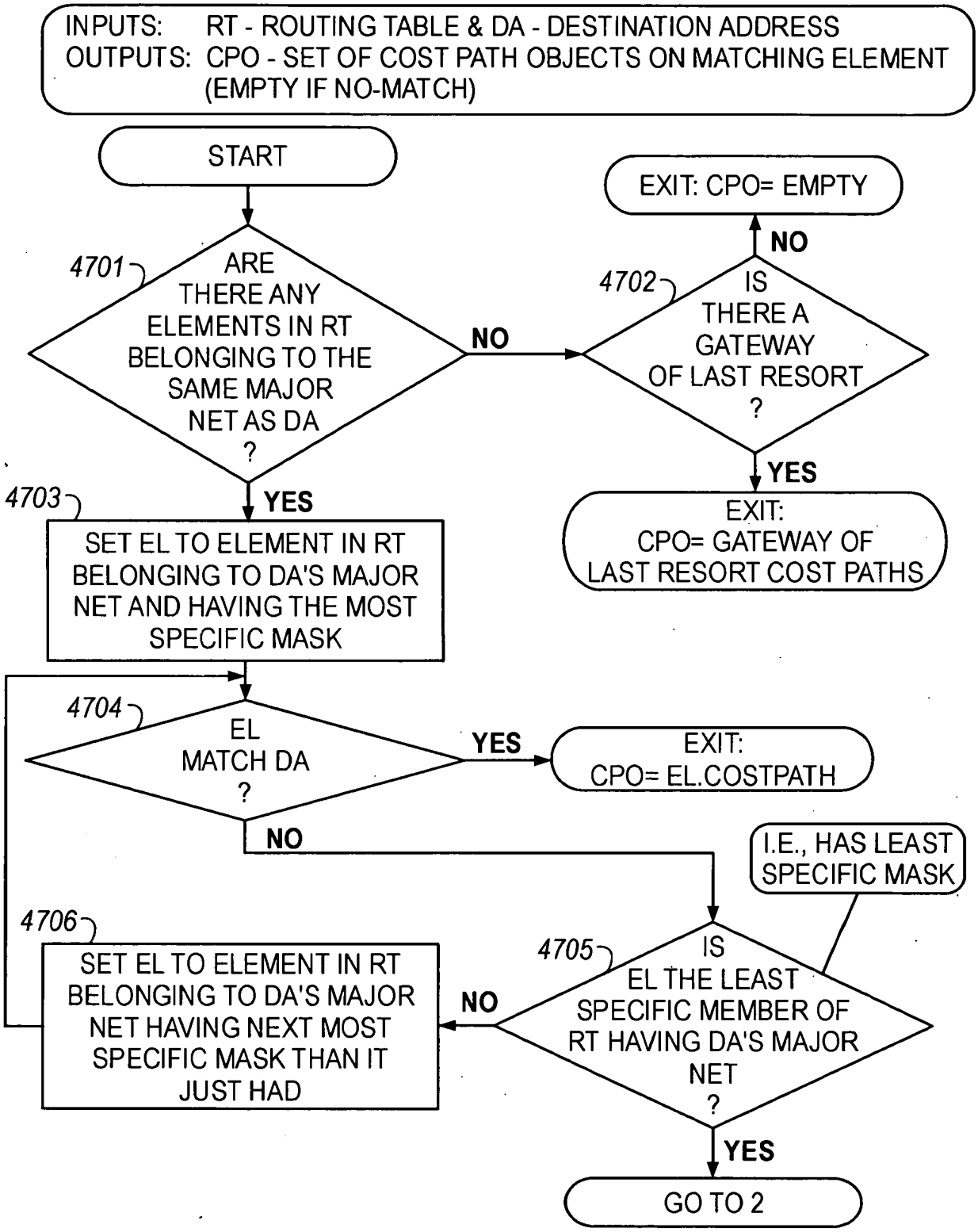


FIG. 47

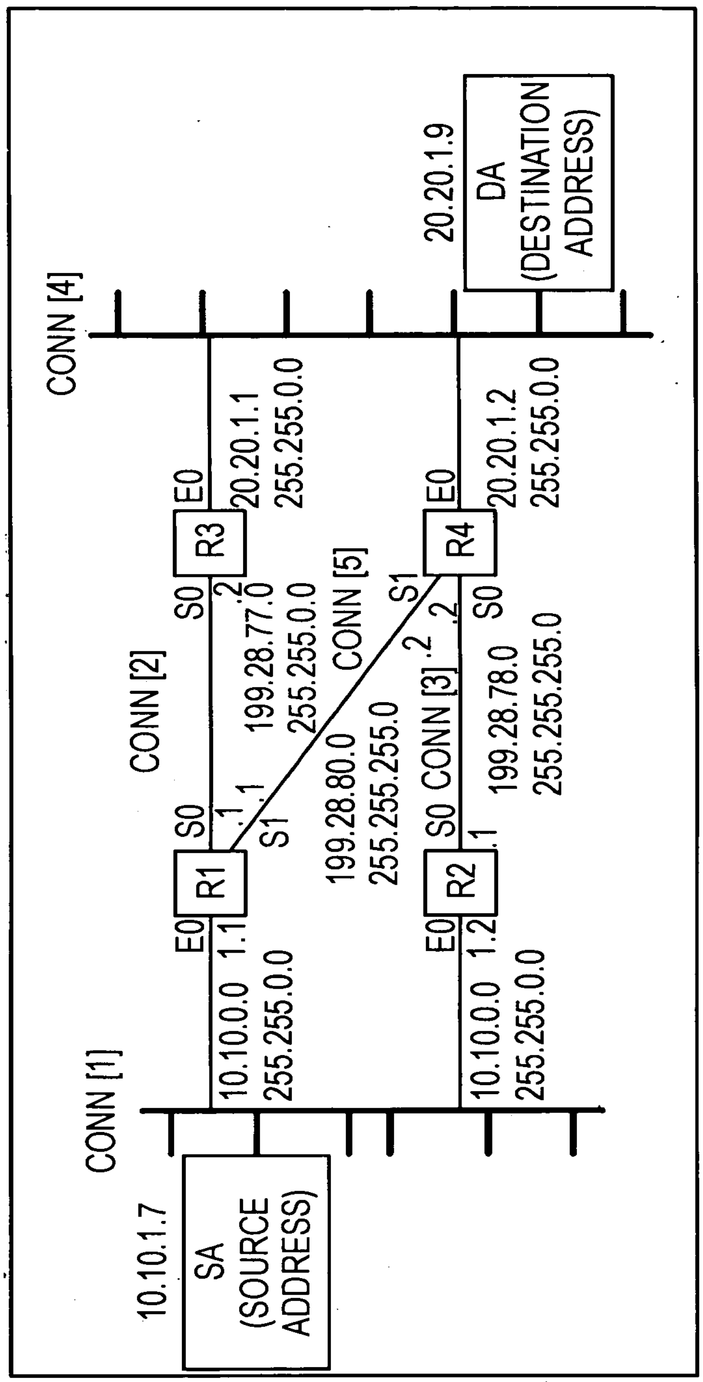

CONN [1]
CONN [2]
CONN [3]
CONN [4]
CONN [5]
10.10.1.7
SA (SOURCE ADDRESS)
20.20.1.9
DA (DESTINATION ADDRESS)
R1
R2
R3
R4
E0
S0
S1
10.10.0.0 1.1
255.255.0.0
10.10.0.0 1.2
255.255.0.0
199.28.77.0
255.255.0.0
199.28.80.0
255.255.255.0
199.28.78.0
255.255.255.0
20.20.1.1
255.255.0.0
20.20.1.2
255.255.0.0
.1
.2

FIG. 48

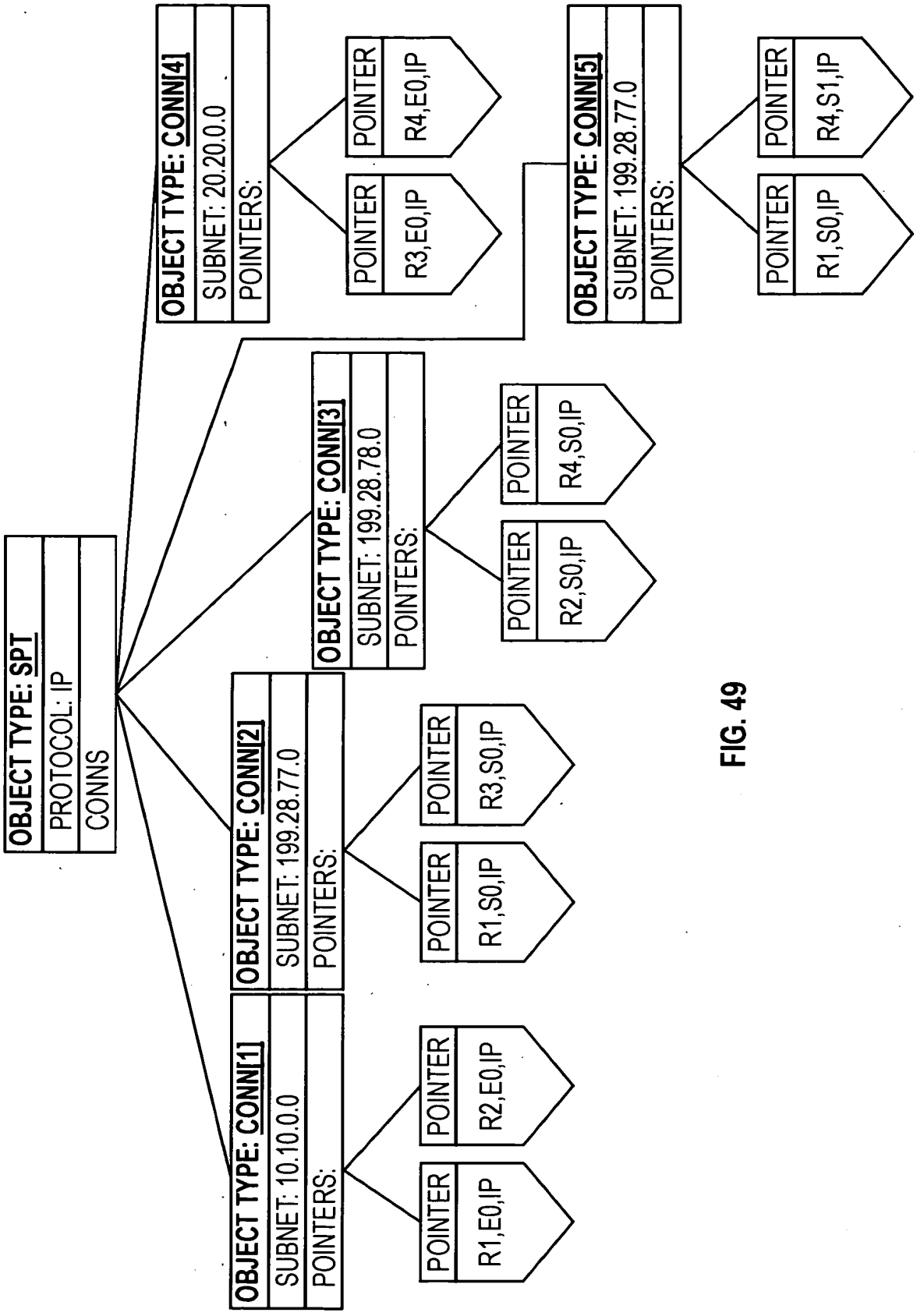

OBJECT TYPE: SPT
PROTOCOL: IP
CONNS
OBJECT TYPE: CONN[1]
SUBNET: 10.10.0.0
POINTERS:
POINTER
R1,E0,IP
POINTER
R2,E0,IP
OBJECT TYPE: CONN[2]
SUBNET: 199.28.77.0
POINTERS:
POINTER
R1,S0,IP
POINTER
R3,S0,IP
OBJECT TYPE: CONN[3]
SUBNET: 199.28.78.0
POINTERS:
POINTER
R2,S0,IP
POINTER
R4,S0,IP
OBJECT TYPE: CONN[4]
SUBNET: 20.20.0.0
POINTERS:
POINTER
R3,E0,IP
POINTER
R4,E0,IP
OBJECT TYPE: CONN[5]
SUBNET: 199.28.77.0
POINTERS:
POINTER
R1,S0,IP
POINTER
R4,S1,IP

FIG. 49

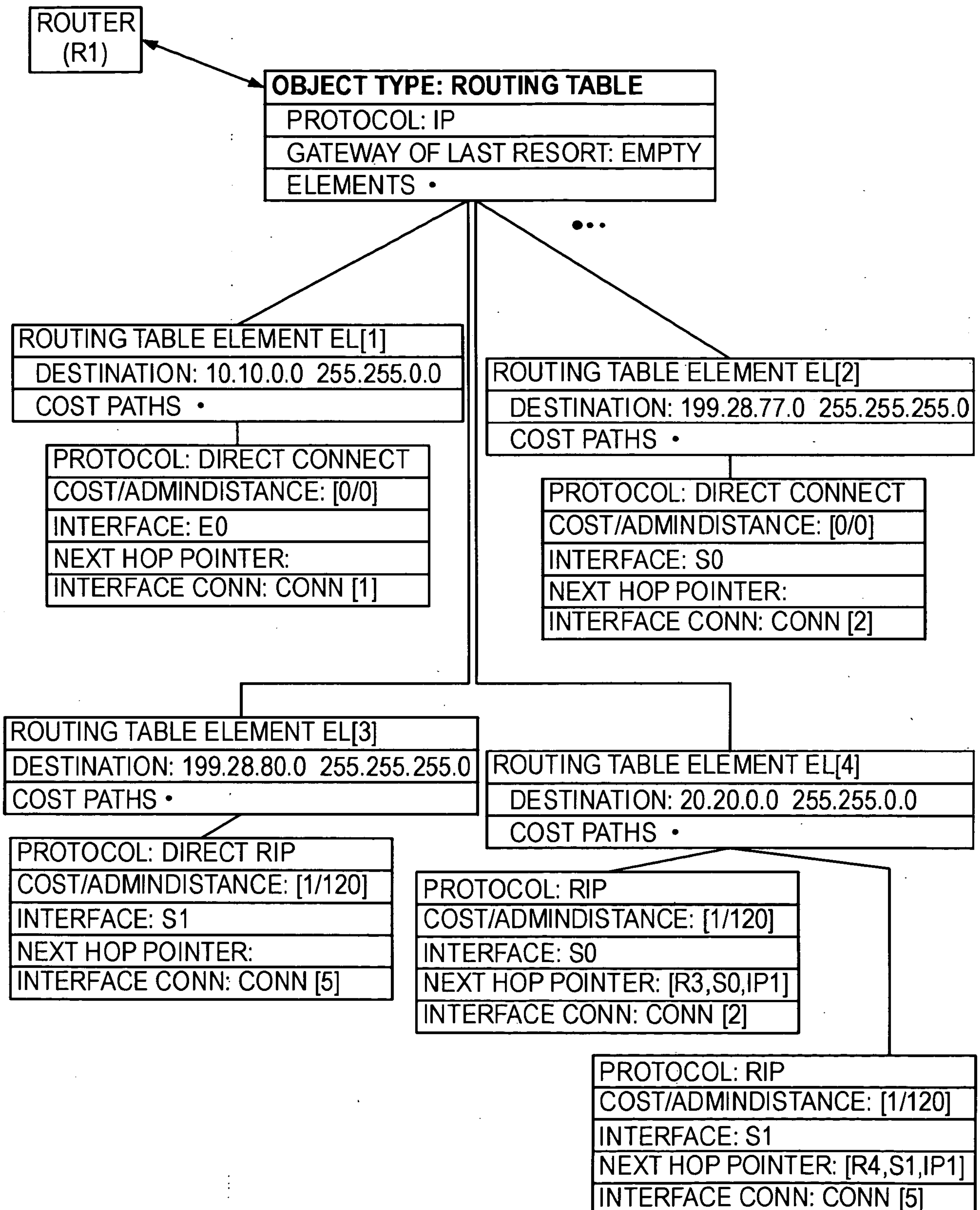


FIG. 50

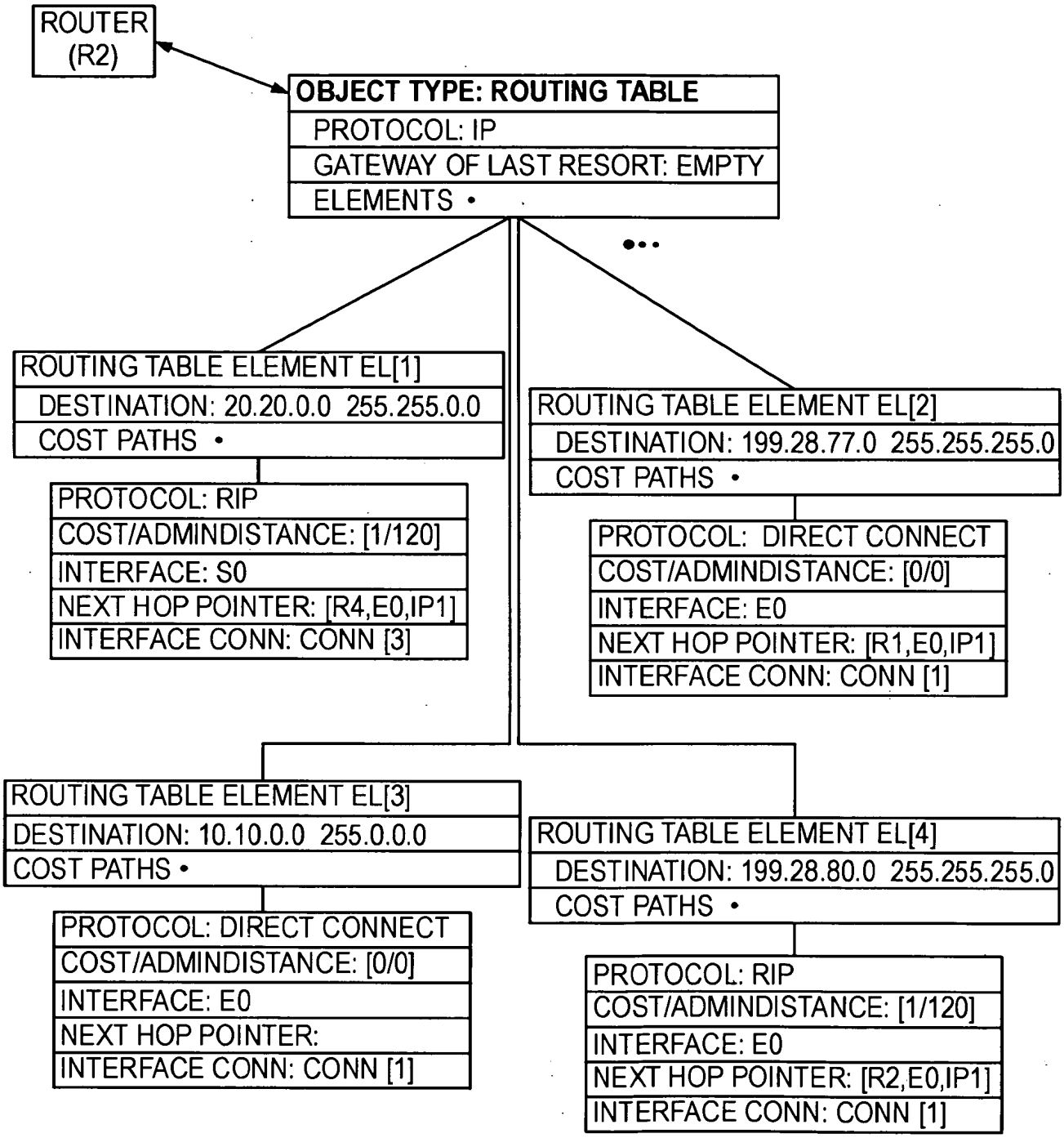


FIG. 51

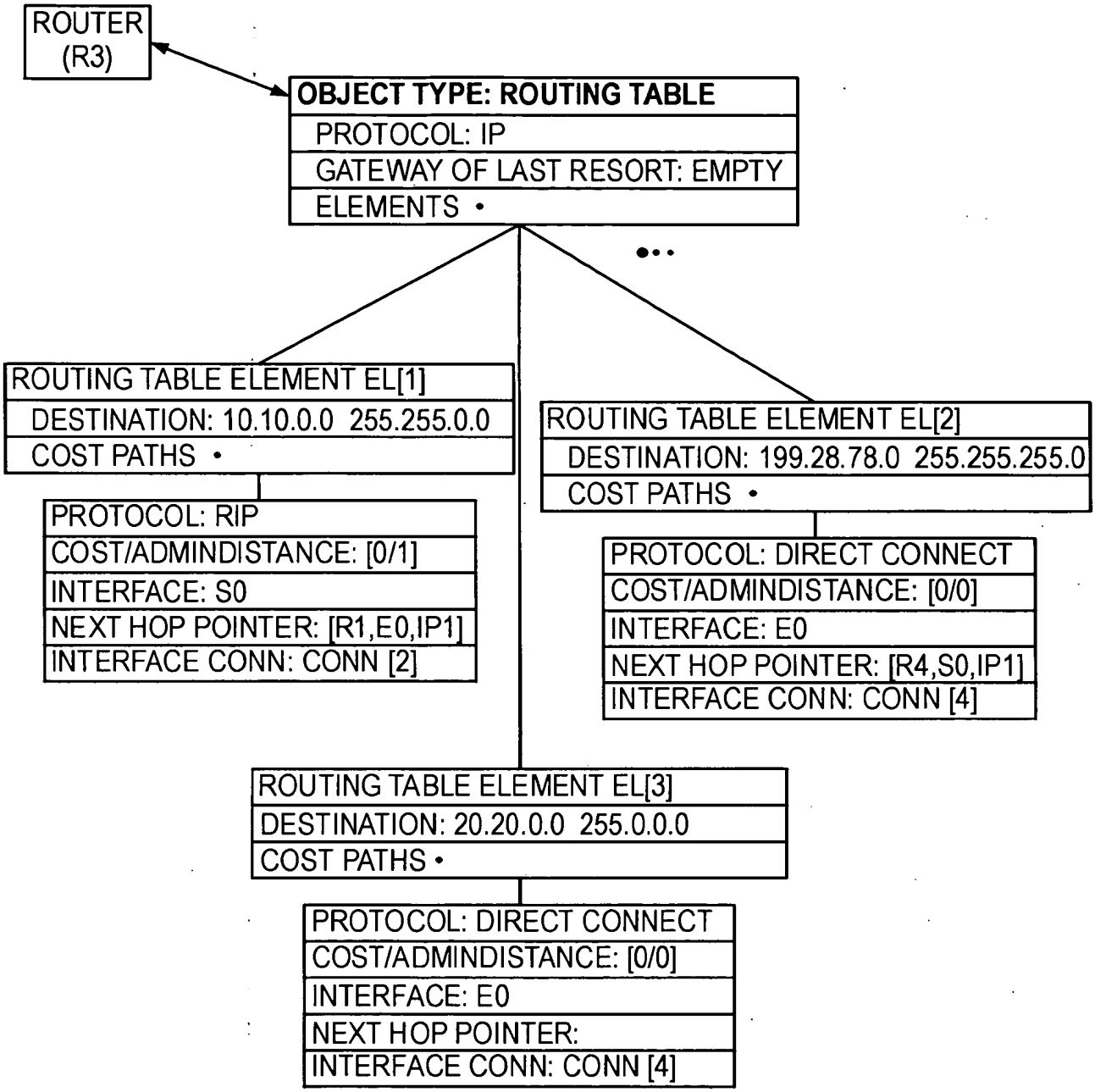


FIG. 52A

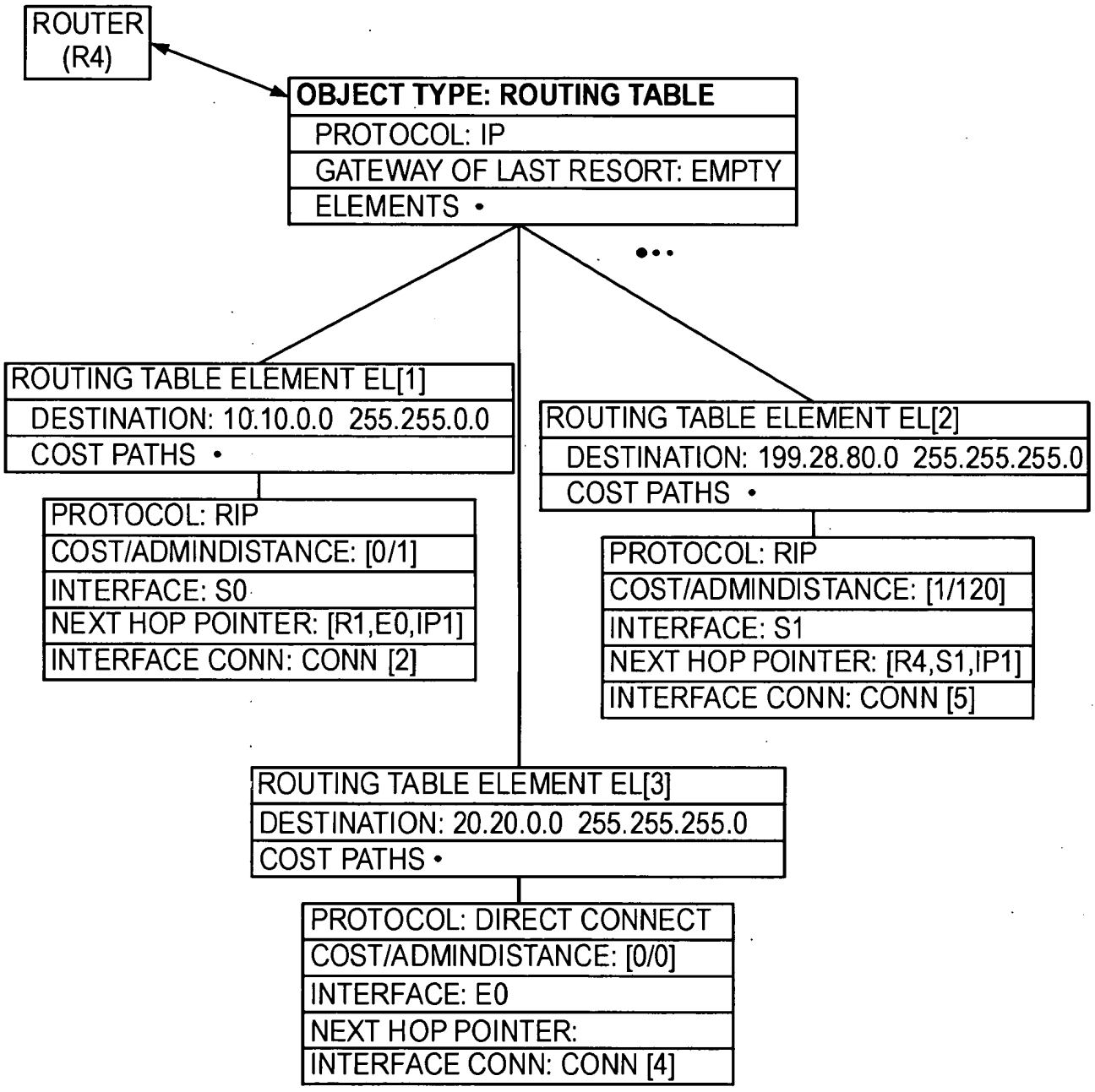


FIG. 52B

NOTE: THE FOLLOWING SEQUENCE OF DATA ELEMENT VALUES AND TOPOLOGY DIAGRAMS SHOWS, STEP-BY-STEP, HOW THE CURRENT PATH SET IS BUILT FROM SOURCE ADDRESS (SA) TO DESTINATION ADDRESS (DA). IN THE DIAGRAMS, NUMBERS REFER TO LOCATIONS IN FIG. 46 AS SIMILARLY LABELED.

BEGINNING AT START, THE PROCESS MOVES AS SHOWN UP TO THE FIRST DECISION BLOCK:

4601-1 CPS={ } (EMPTY) 4602-1 YES 4603-1 SC=CONN[1]

4604-1 DC=CONN [4] 4605-1 NO, SC NOT EQUAL DC

AS OF STEP 4607-1, THE VALUES OF THE ACTIVE PATH SET ARE: APS={[SA;CONN[1];R1, [SA;CONN1];R2]}

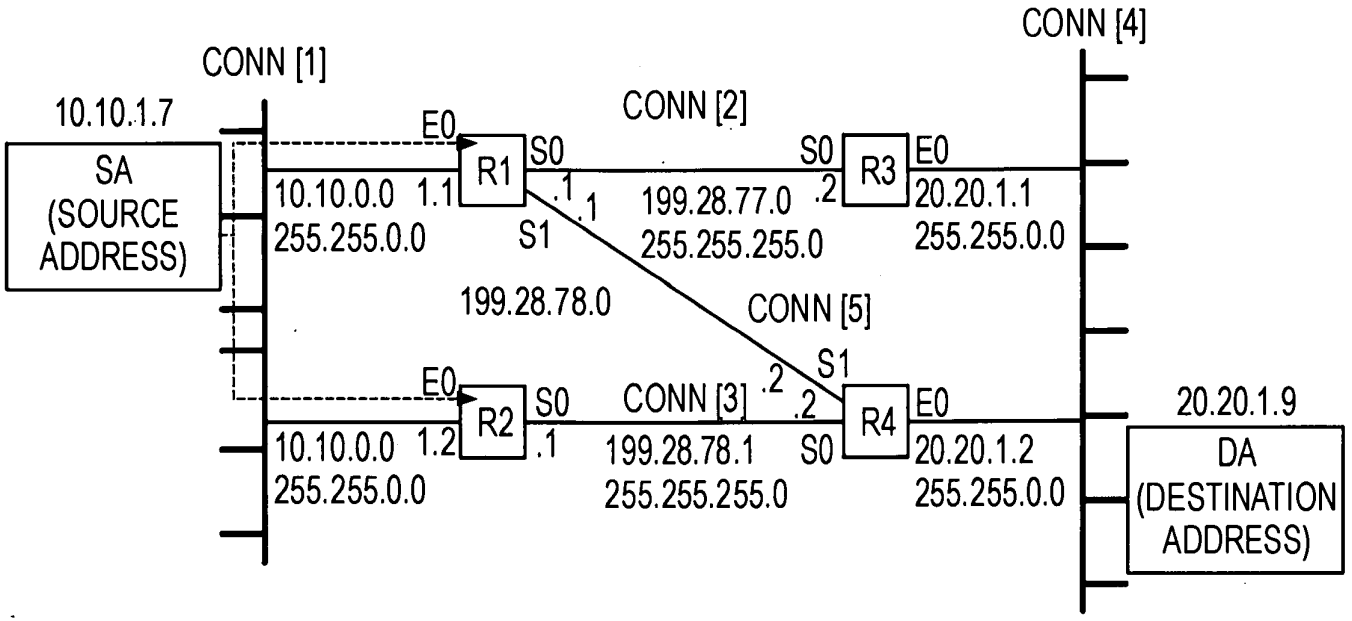


FIG. 53A

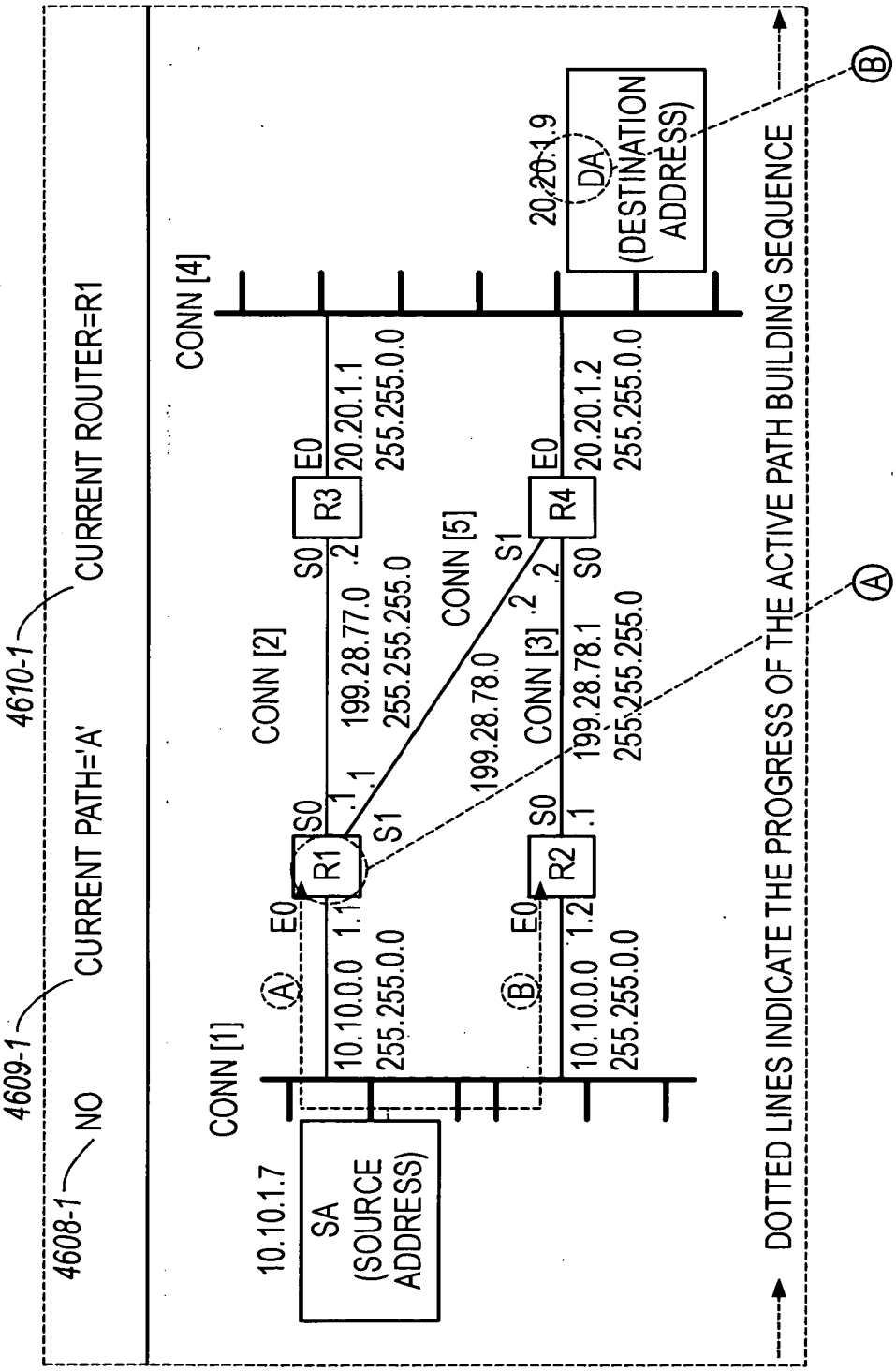

4610-1
CURRENT ROUTER=R1
4609-1
CURRENT PATH='A'
4608-1
NO
CONN [1]
CONN [2]
CONN [3]
CONN [4]
CONN [5]
10.10.1.7
SA
(SOURCE
ADDRESS)
10.10.0.0
255.255.0.0
1.1
1.2
E0
R1
R2
R3
R4
S0
S1
199.28.77.0
255.255.255.0
199.28.78.0
20.20.1.1
20.20.1.2
20.20.1.9
DA
(DESTINATION
ADDRESS)
DOTTED LINES INDICATE THE PROGRESS OF THE ACTIVE PATH BUILDING SEQUENCE

FIG. 53B

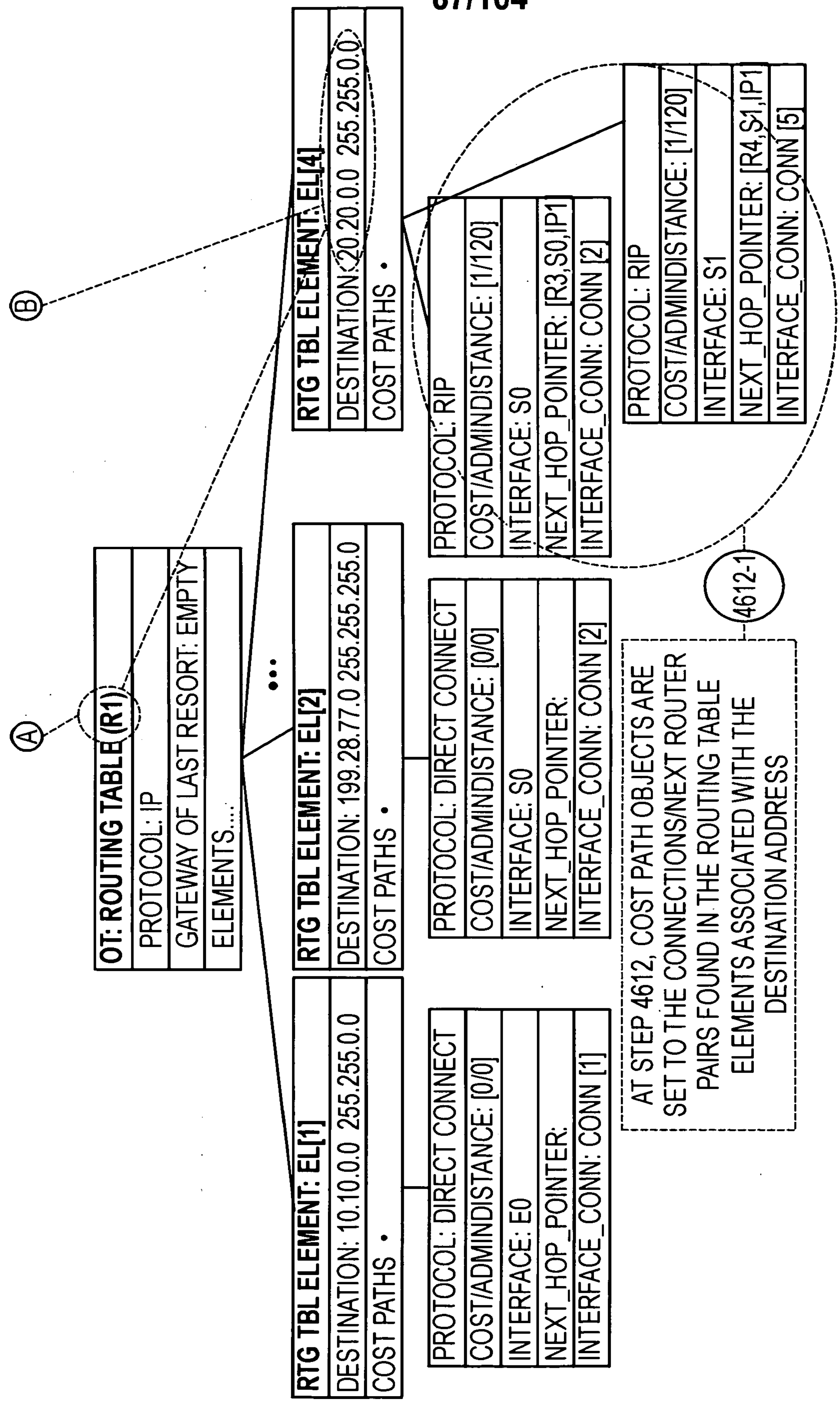

A
B
OT: ROUTING TABLE (R1)
PROTOCOL: IP
GATEWAY OF LAST RESORT: EMPTY
ELEMENTS.....
RTG TBL ELEMENT: EL[1]
DESTINATION: 10.10.0.0 255.255.0.0
COST PATHS •
PROTOCOL: DIRECT CONNECT
COST/ADMINDISTANCE: [0/0]
INTERFACE: E0
NEXT_HOP_POINTER:
INTERFACE_CONN: CONN [1]
RTG TBL ELEMENT: EL[2]
DESTINATION: 199.28.77.0 255.255.255.0
COST PATHS •
PROTOCOL: DIRECT CONNECT
COST/ADMINDISTANCE: [0/0]
INTERFACE: S0
NEXT_HOP_POINTER:
INTERFACE_CONN: CONN [2]
RTG TBL ELEMENT: EL[4]
DESTINATION: 20.20.0.0 255.255.0.0
COST PATHS •
PROTOCOL: RIP
COST/ADMINDISTANCE: [1/120]
INTERFACE: S0
NEXT_HOP_POINTER: [R3,S0,IP1]
INTERFACE_CONN: CONN [2]
PROTOCOL: RIP
COST/ADMINDISTANCE: [1/120]
INTERFACE: S1
NEXT_HOP_POINTER: [R4,S1,IP1]
INTERFACE_CONN: CONN [5]
4612-1
AT STEP 4612, COST PATH OBJECTS ARE SET TO THE CONNECTIONS/NEXT ROUTER PAIRS FOUND IN THE ROUTING TABLE ELEMENTS ASSOCIATED WITH THE DESTINATION ADDRESS

FIG. 53C

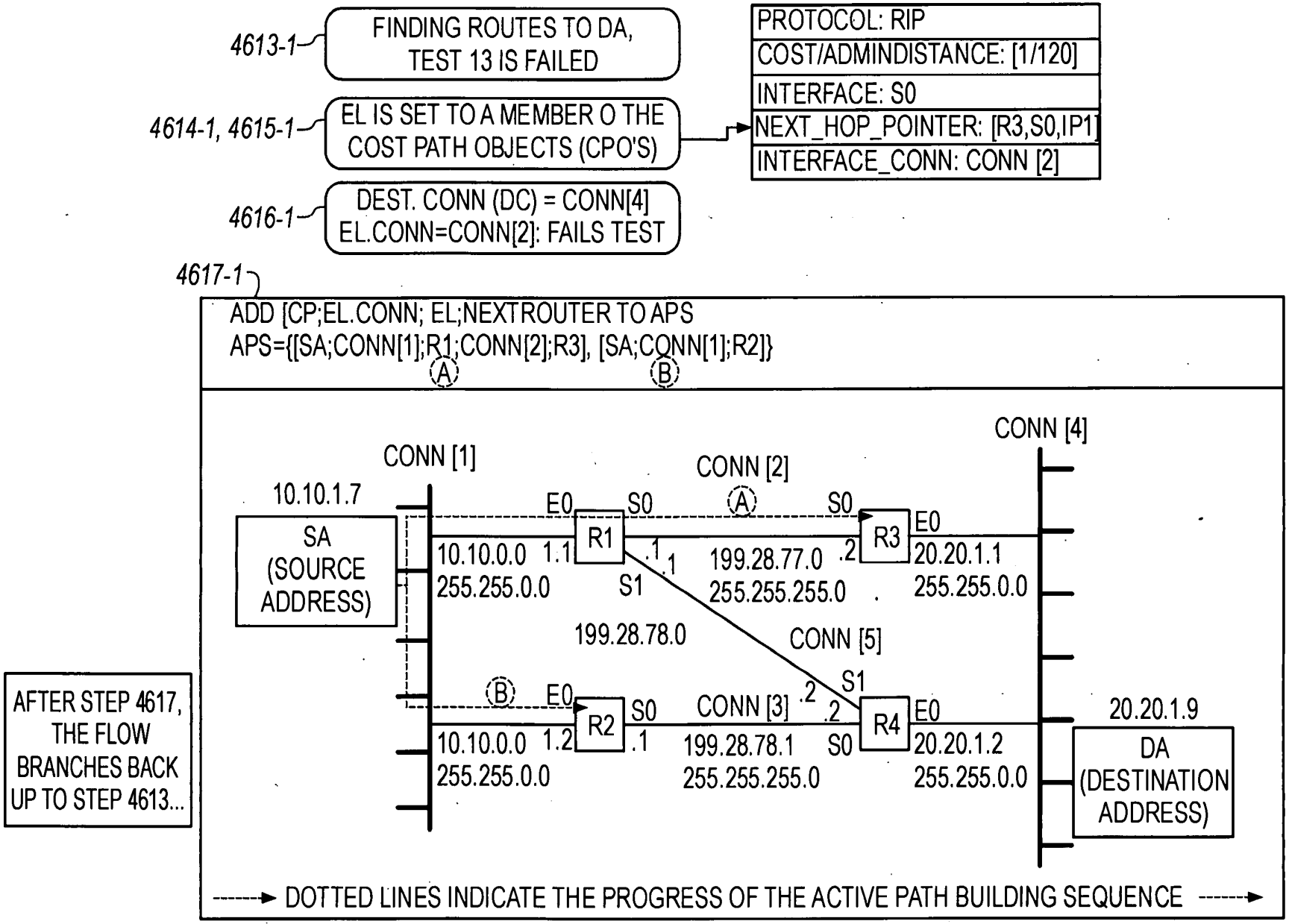


FIG. 53D

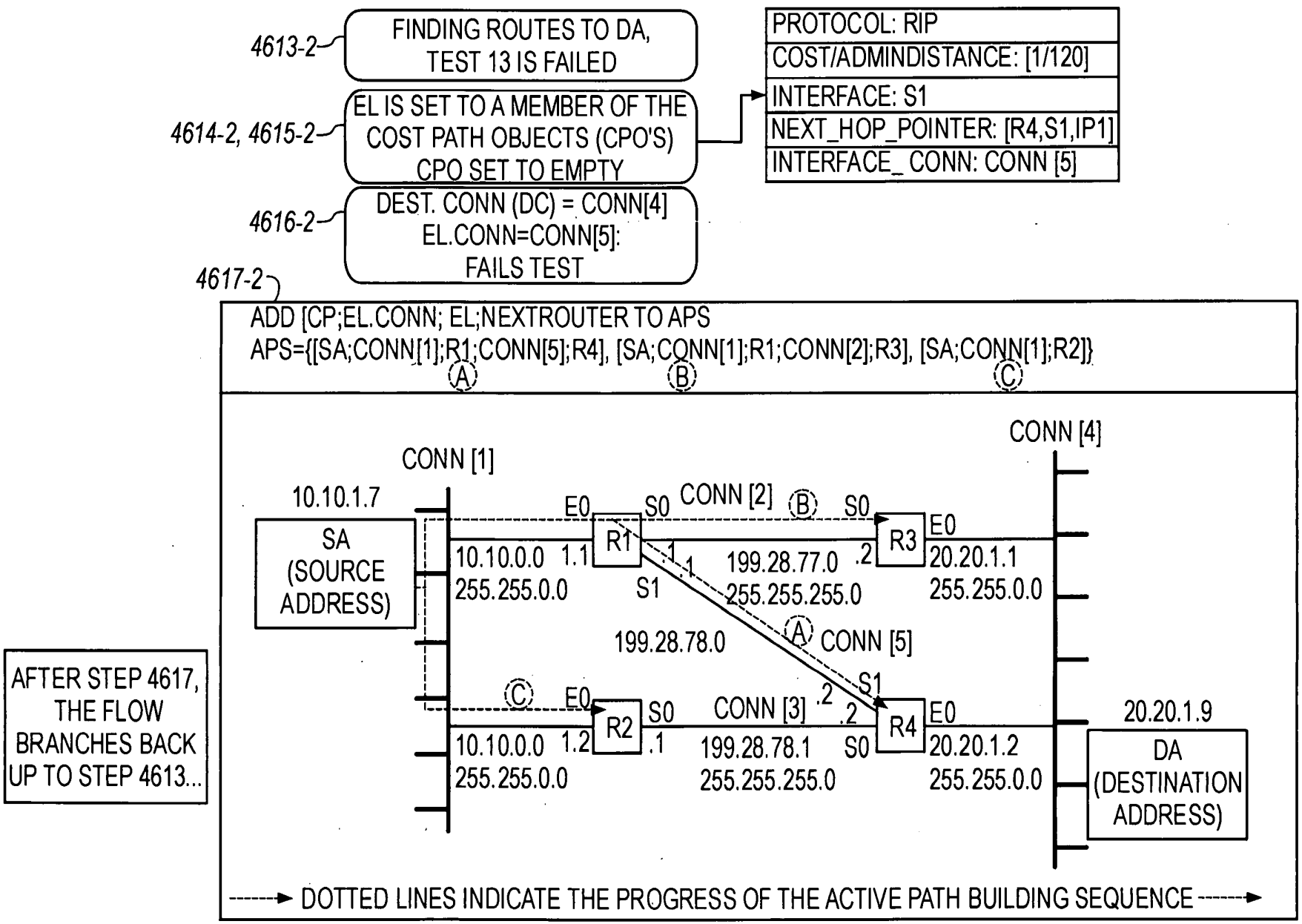


FIG. 53E

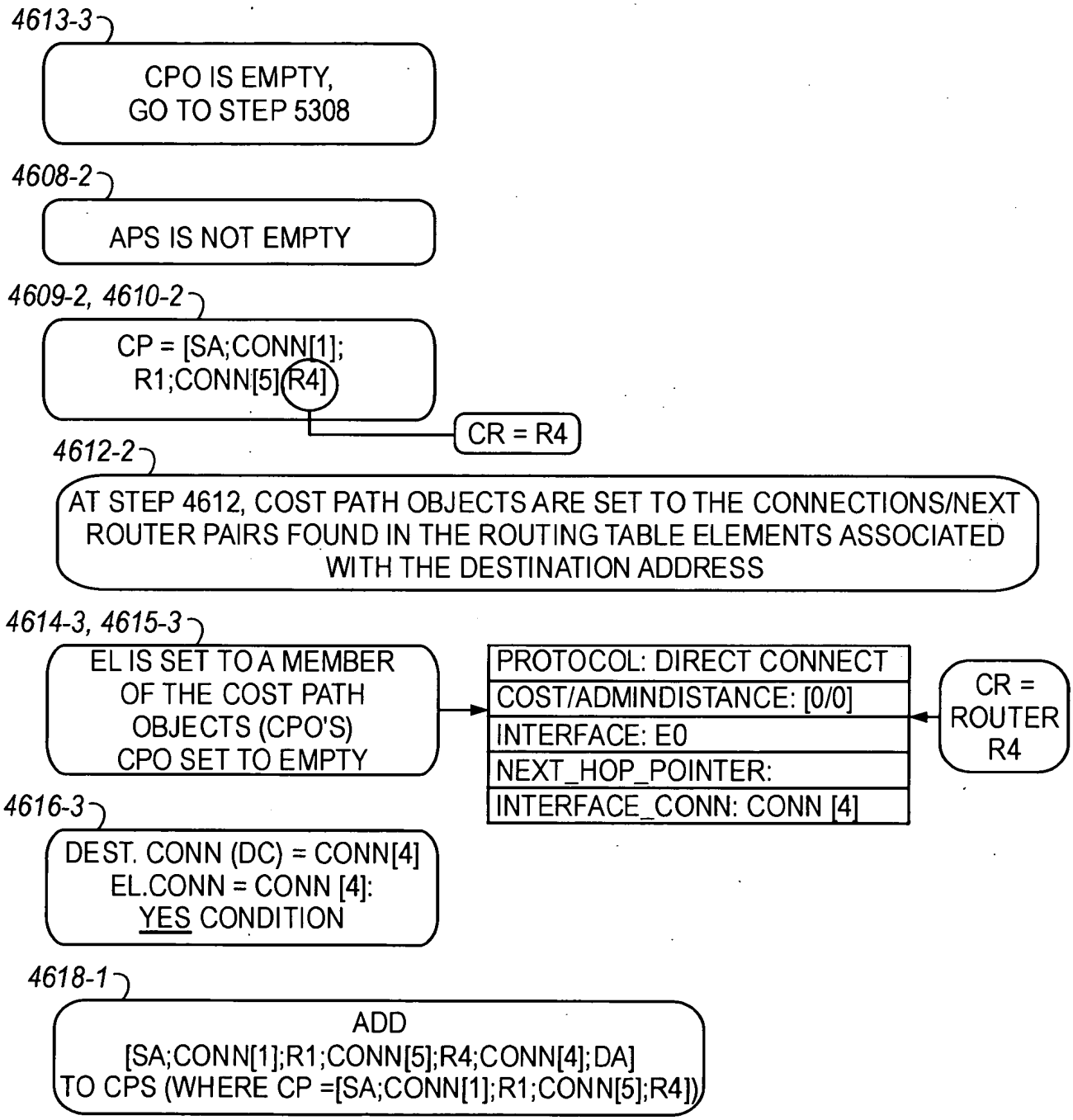
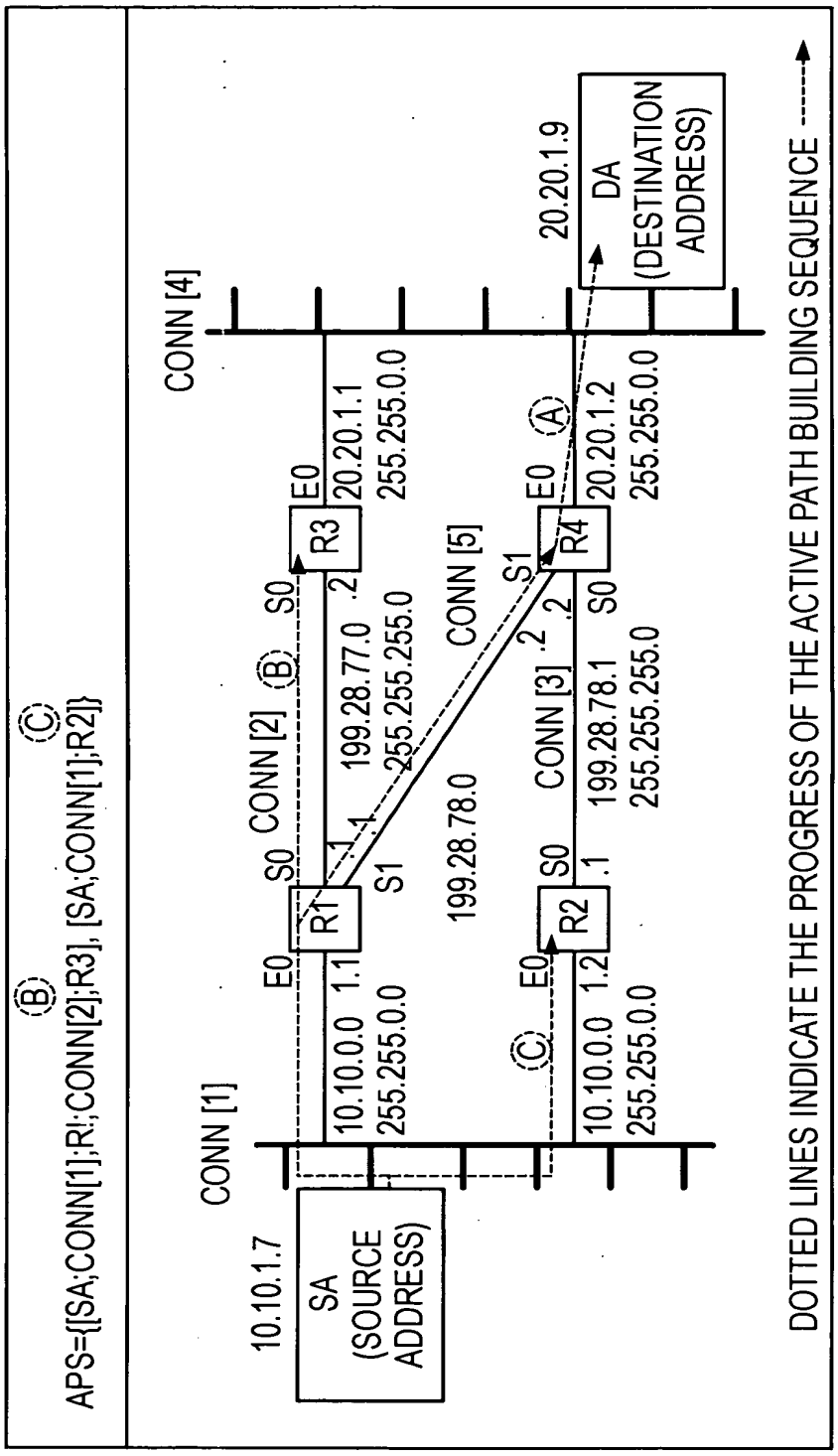


FIG. 53F



NOTE: AT THIS JUNCTURE, THE FIRST COMPLETED PATH FROM SA TO DA HAS BEEN ESTABLISHED. THE ALGORITHM WILL CONTINUE AS SHOWN ABOVE BETWEEN STEP 4613-3, AND STEP 4608-2 UNTIL ALL PATHS HAVE BEEN ESTABLISHED. THEN THE APS WILL BE EMPTY AND THE ALGORITHM EXITED.

FIG. 53G

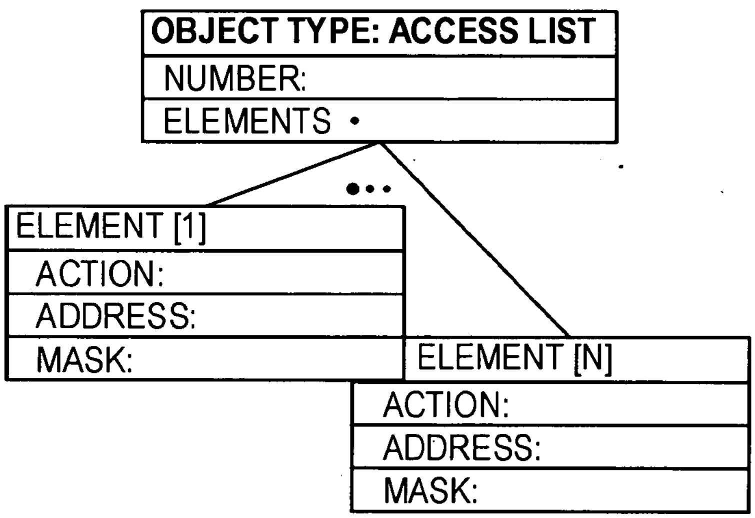


FIG. 54

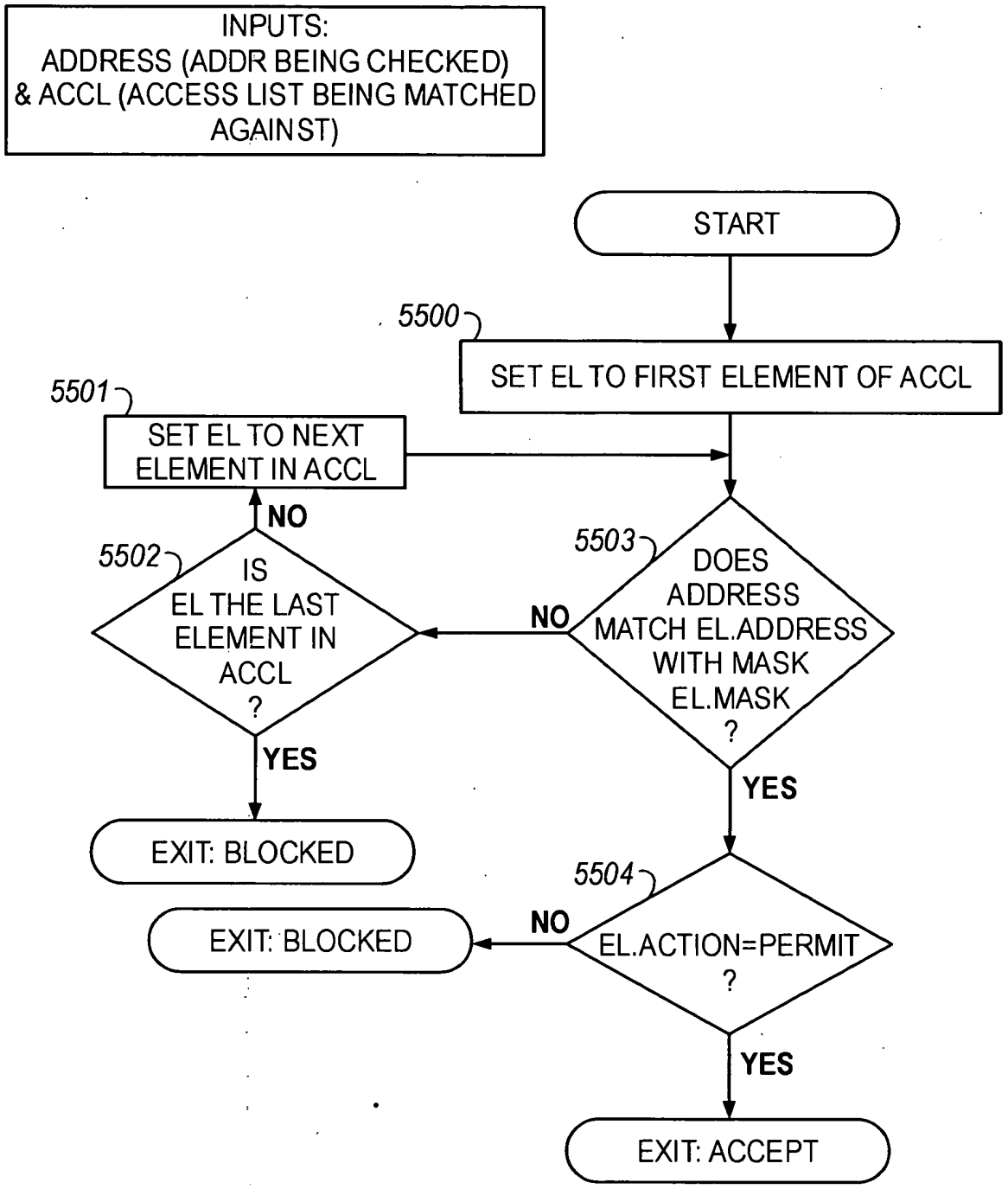


FIG. 55

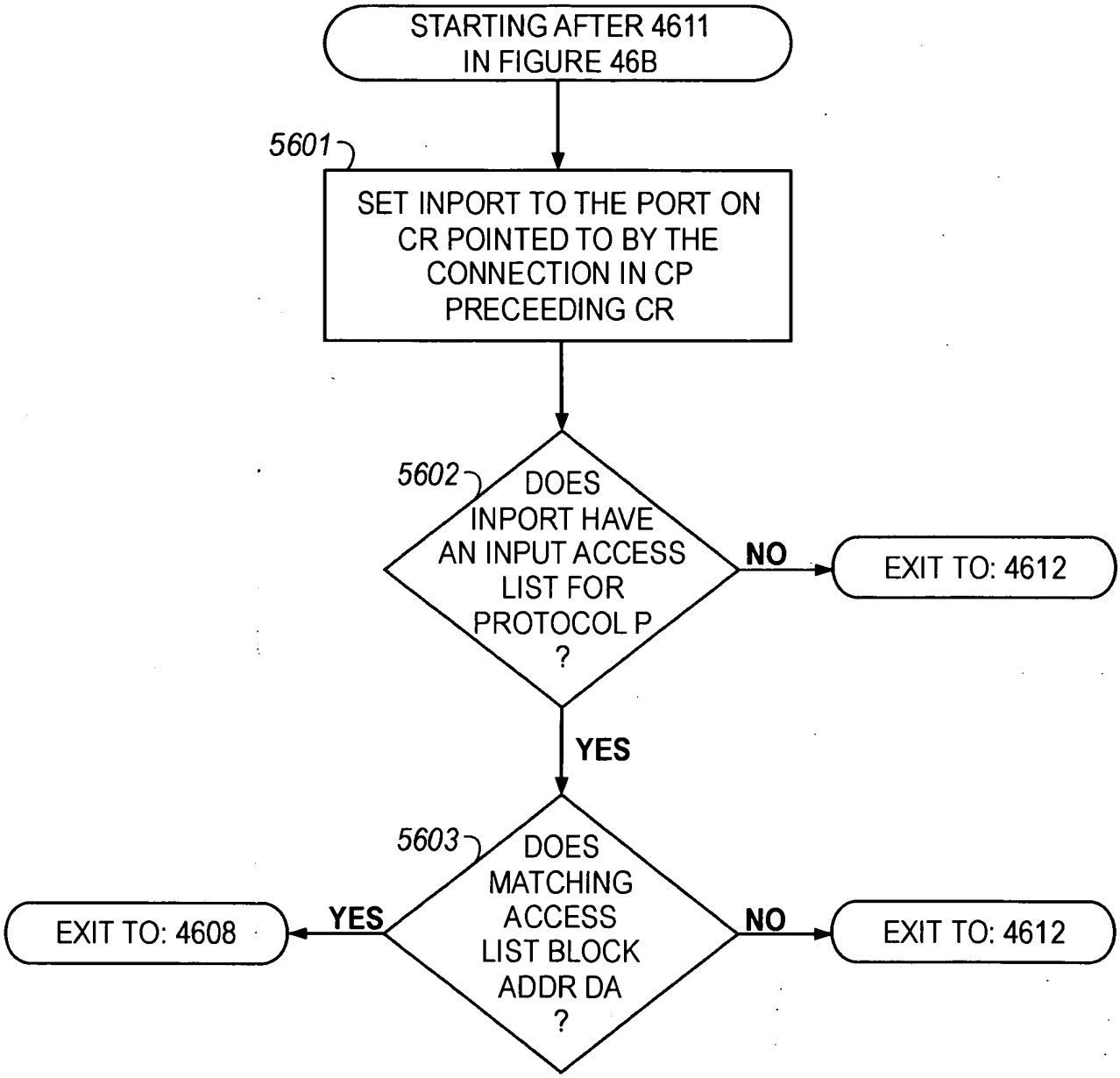


FIG. 56

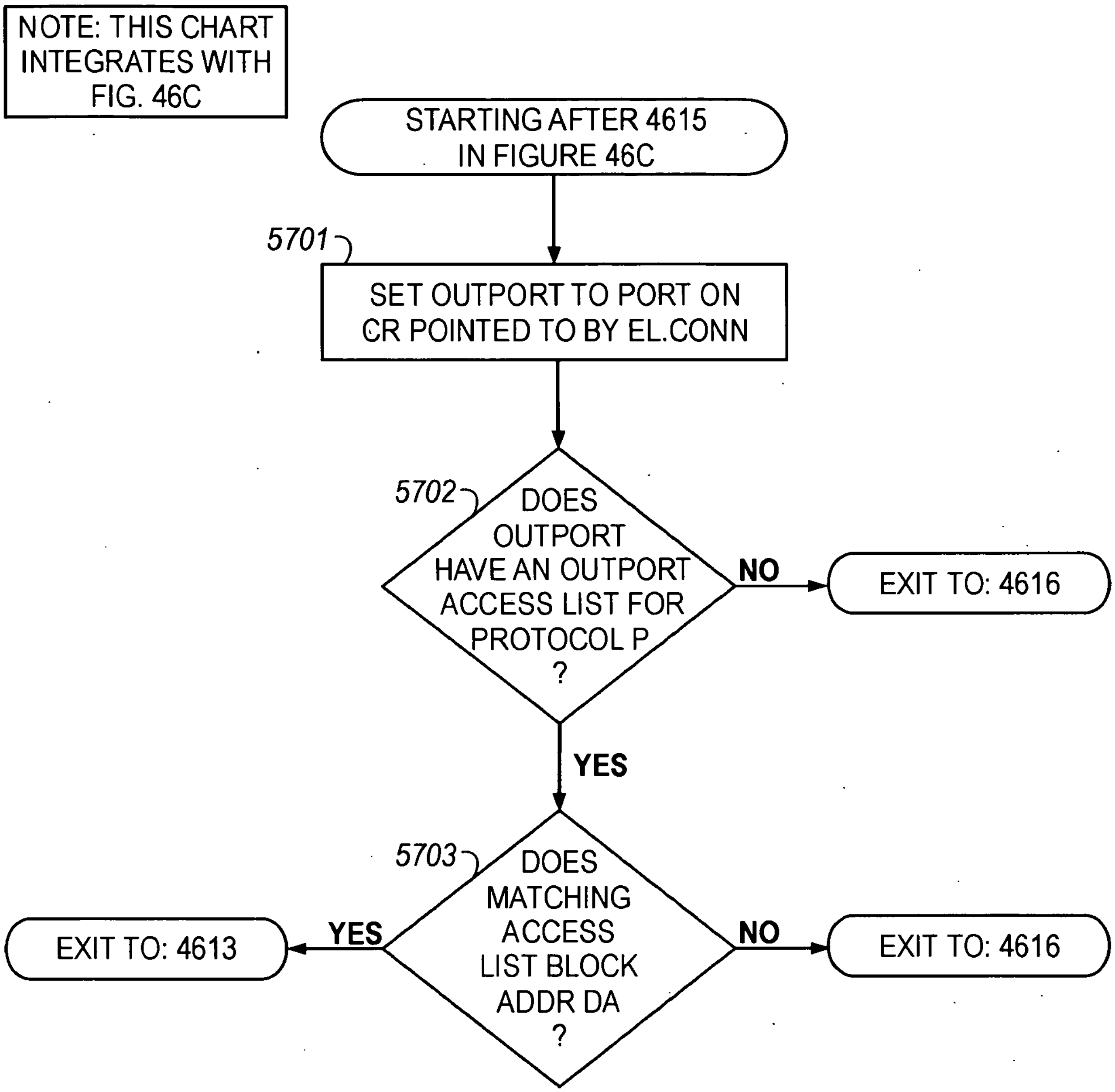


FIG. 57

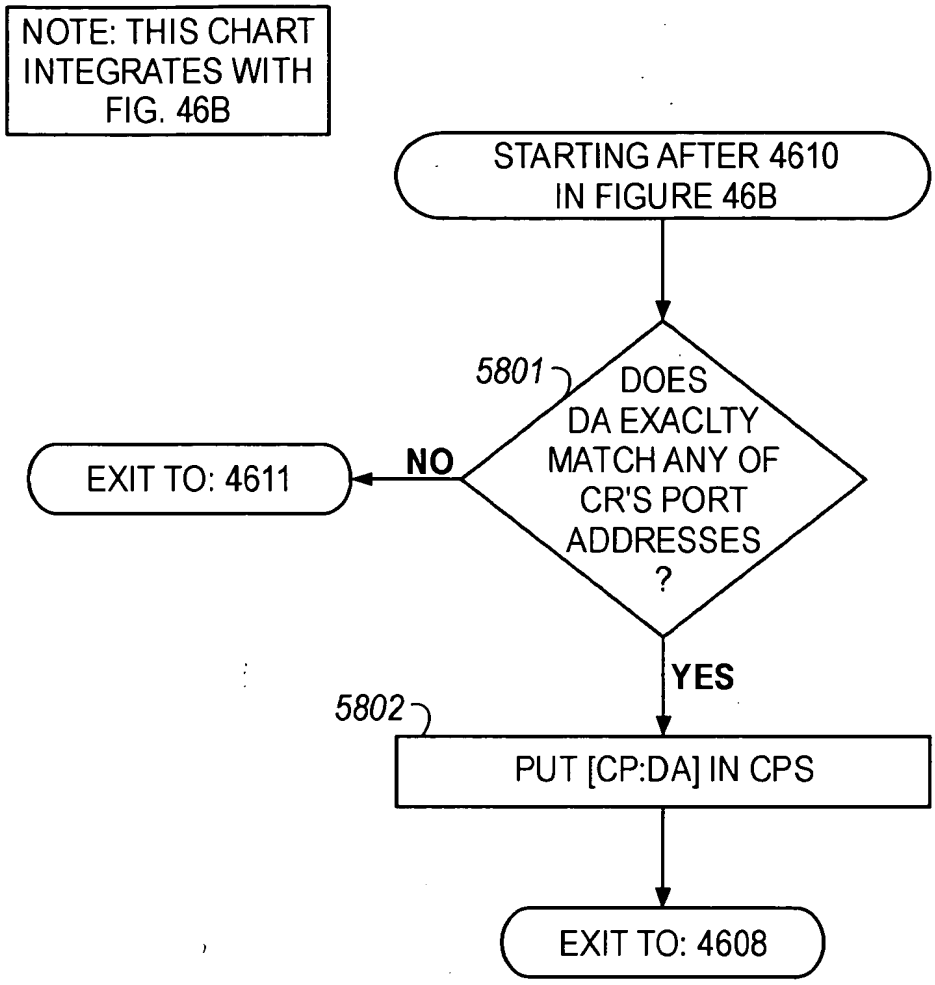


FIG. 58

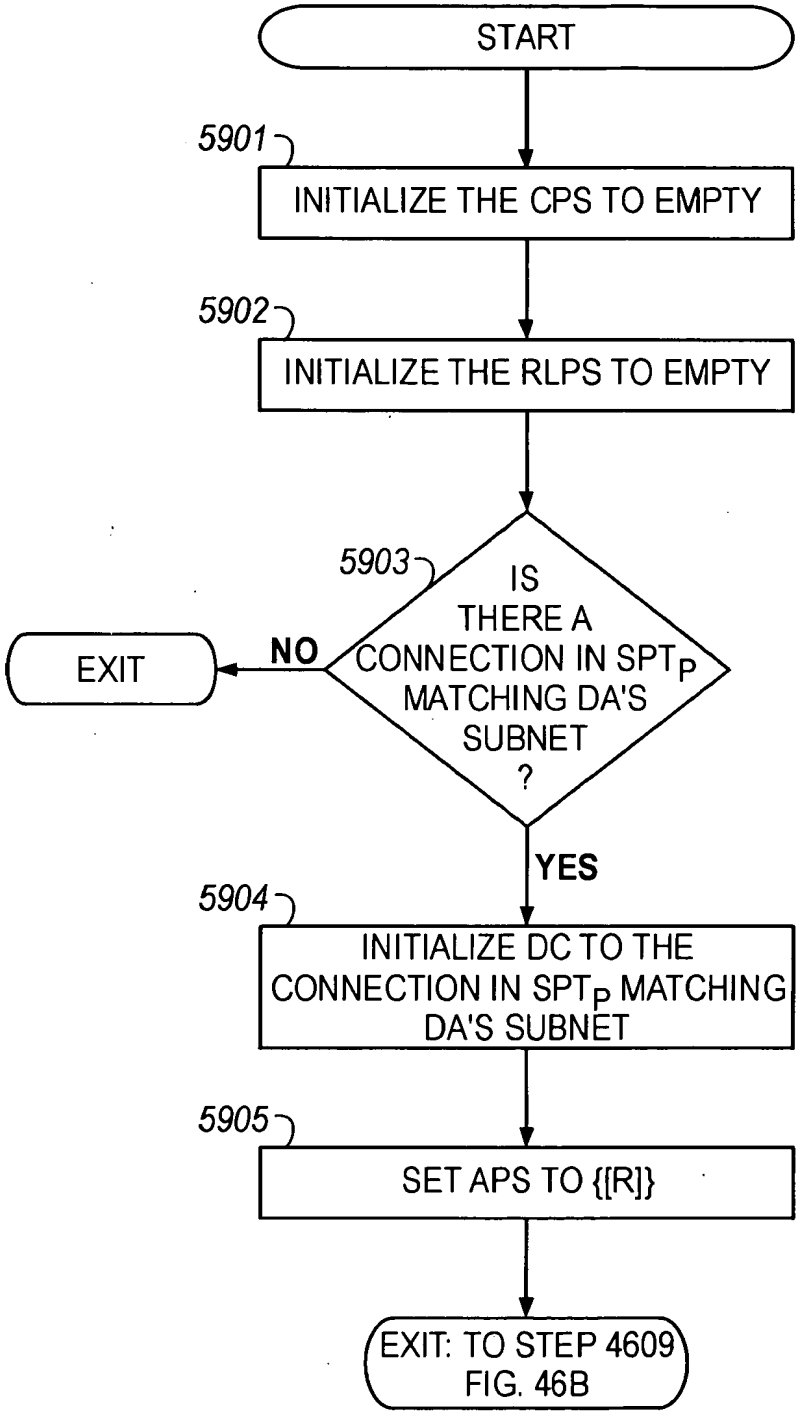


FIG. 59

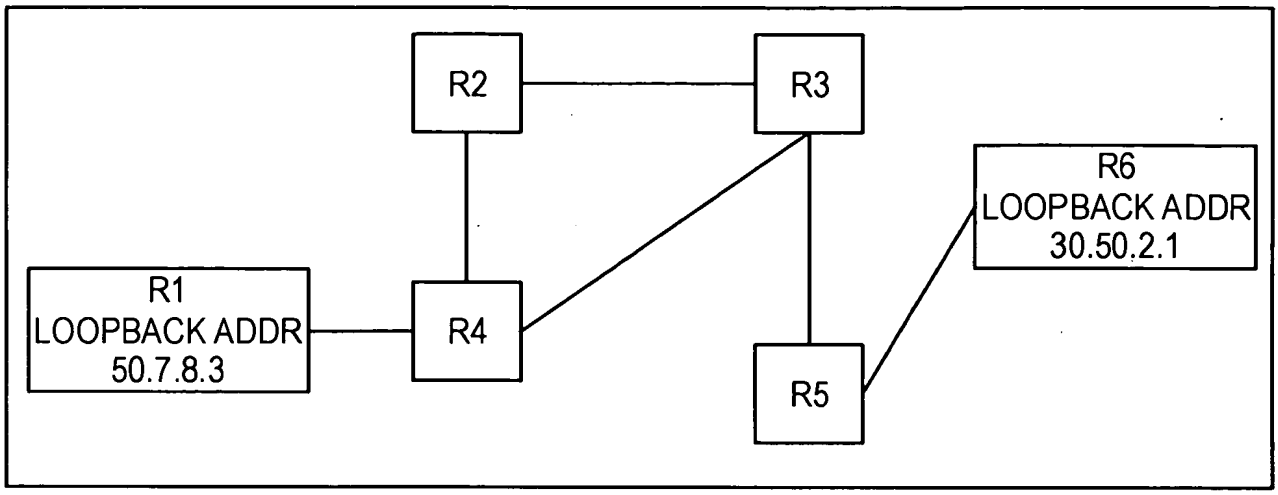


FIG. 60

ROUTER R1:

```
VERSION 10.0
!
HOSTNAME ROUTER1
!
SOURCE-BRIDGE RING-GROUP 7
SOURCE-BRIDGE 7 TCP 30.50.2.1
!
INTERFACE LOOPBACK 1
IP ADDRESS 50.7.8.3  255.255.0.0
!
END
```

FIG. 61A

ROUTER R6:

```
VERSION 10.0
!
HOSTNAME ROUTER6
!
SOURCE-BRIDGE RING-GROUP 7
SOURCE-BRIDGE 7 TCP 50.7.8.3
!
INTERFACE LOOPBACK 0
IP ADDRESS 30.50.2.1  255.255.0.0
!
END
```

FIG. 61B

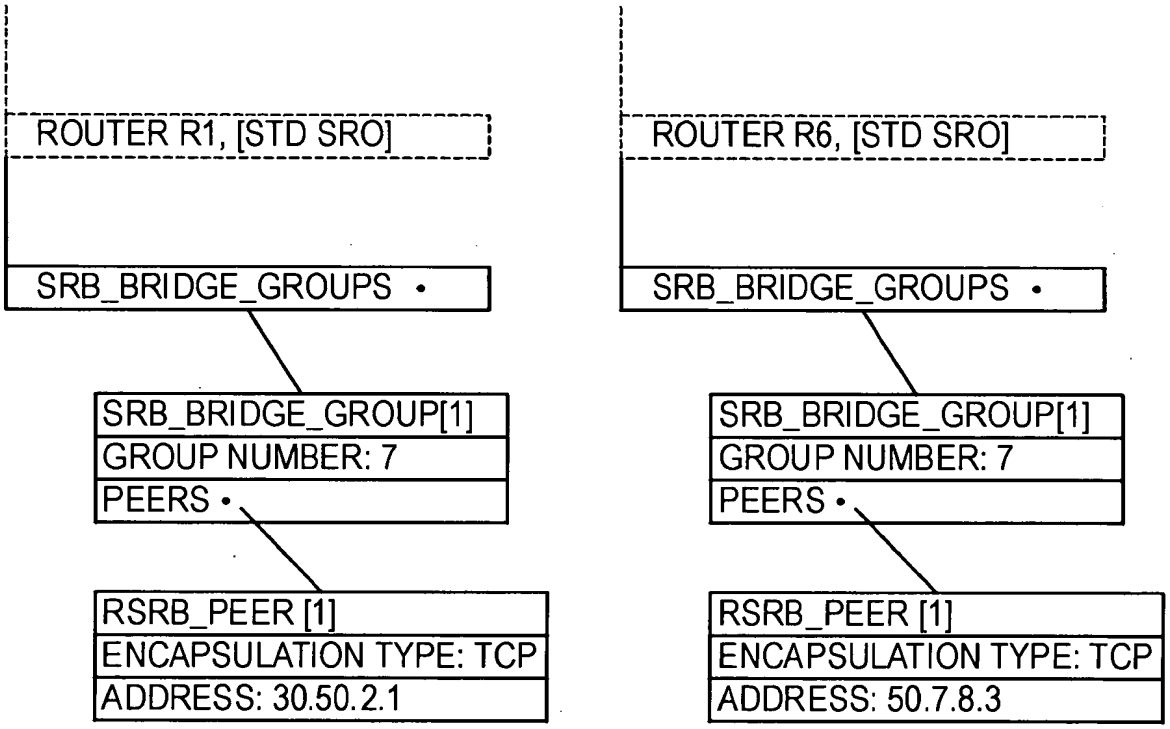

ROUTER R1, [STD SRO]
SRB_BRIDGE_GROUPS •
SRB_BRIDGE_GROUP[1]
GROUP NUMBER: 7
PEERS •
RSRB_PEER [1]
ENCAPSULATION TYPE: TCP
ADDRESS: 30.50.2.1
ROUTER R6, [STD SRO]
SRB_BRIDGE_GROUPS •
SRB_BRIDGE_GROUP[1]
GROUP NUMBER: 7
PEERS •
RSRB_PEER [1]
ENCAPSULATION TYPE: TCP
ADDRESS: 50.7.8.3

FIG. 62

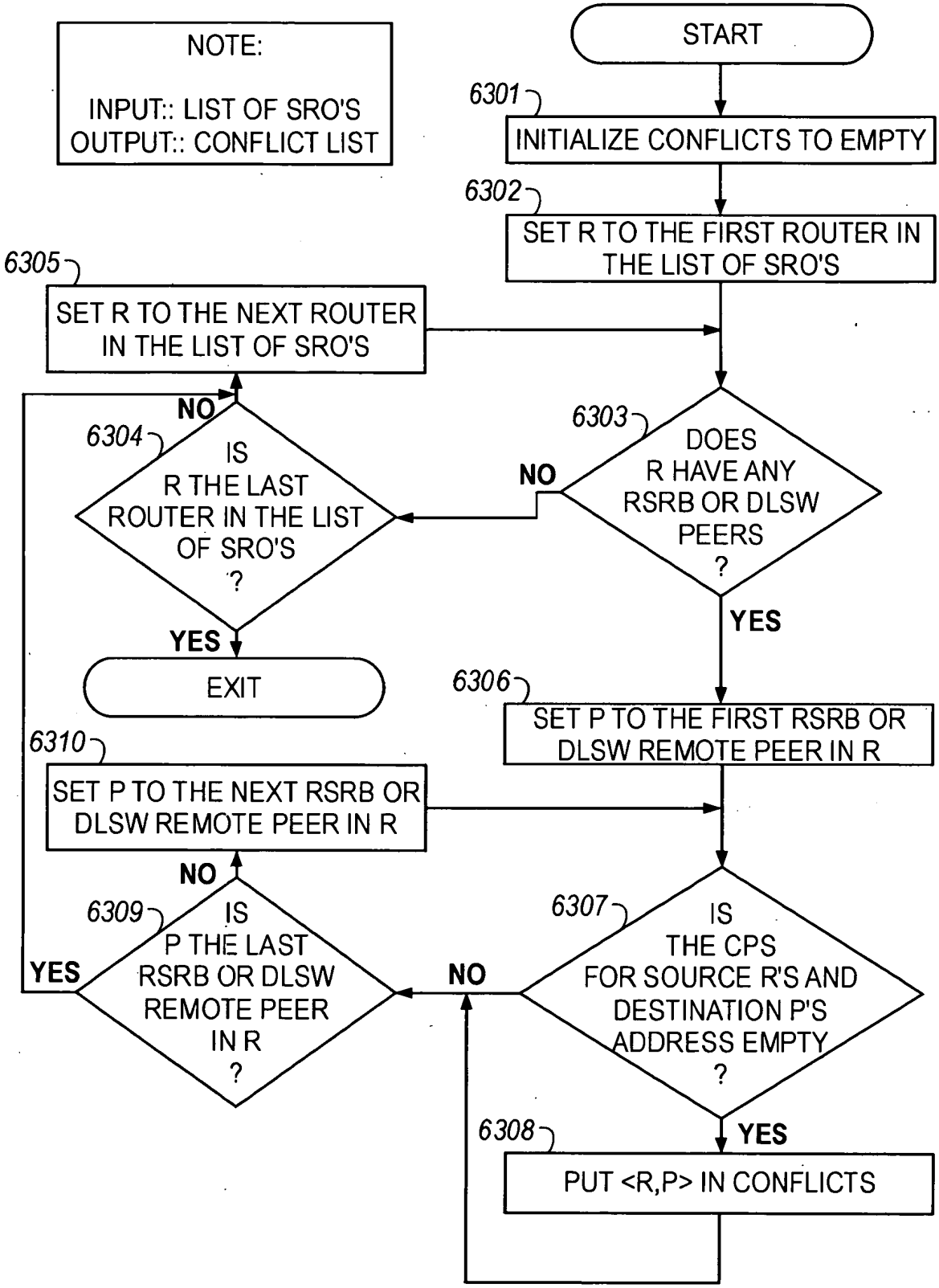


FIG. 63

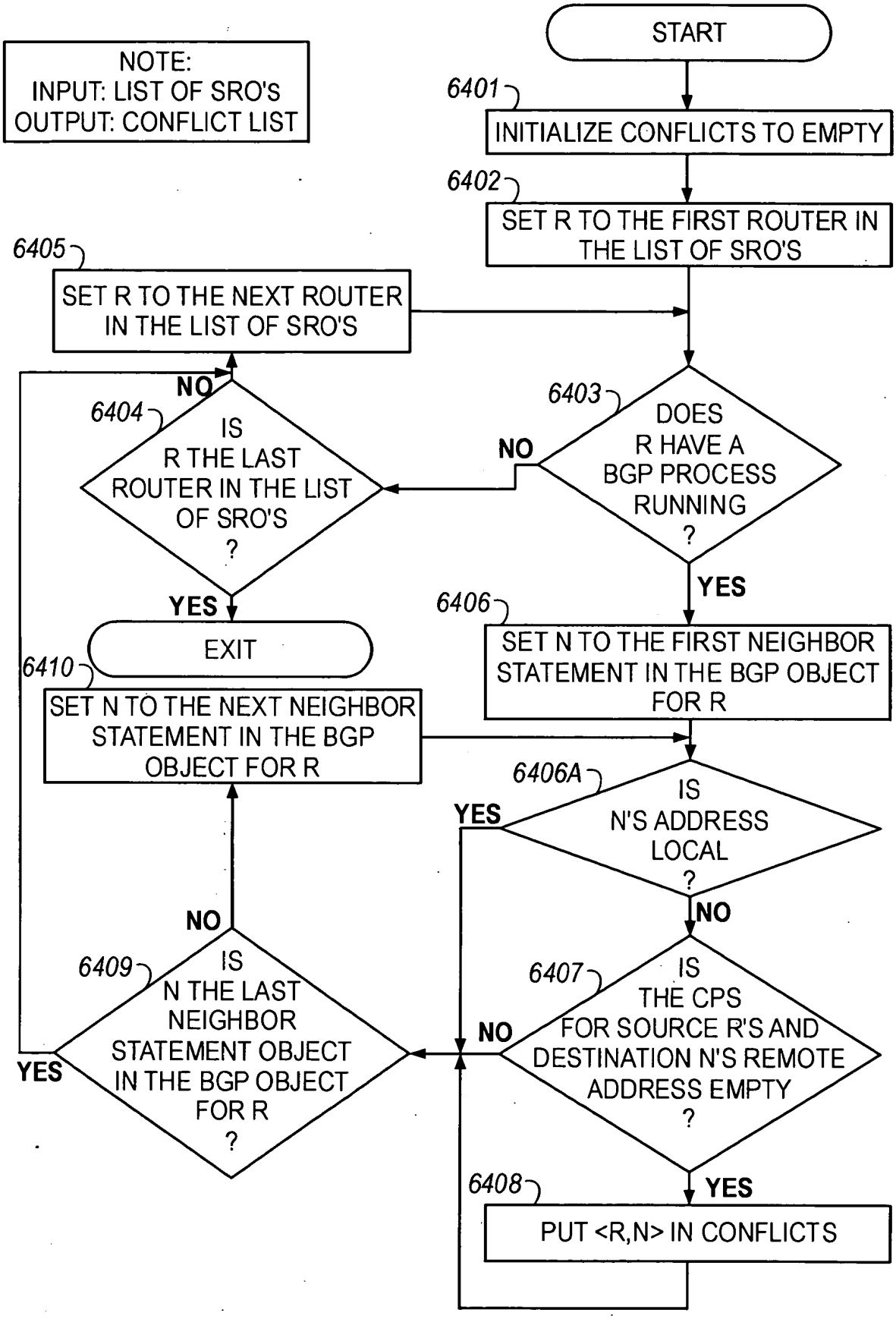


FIG. 64

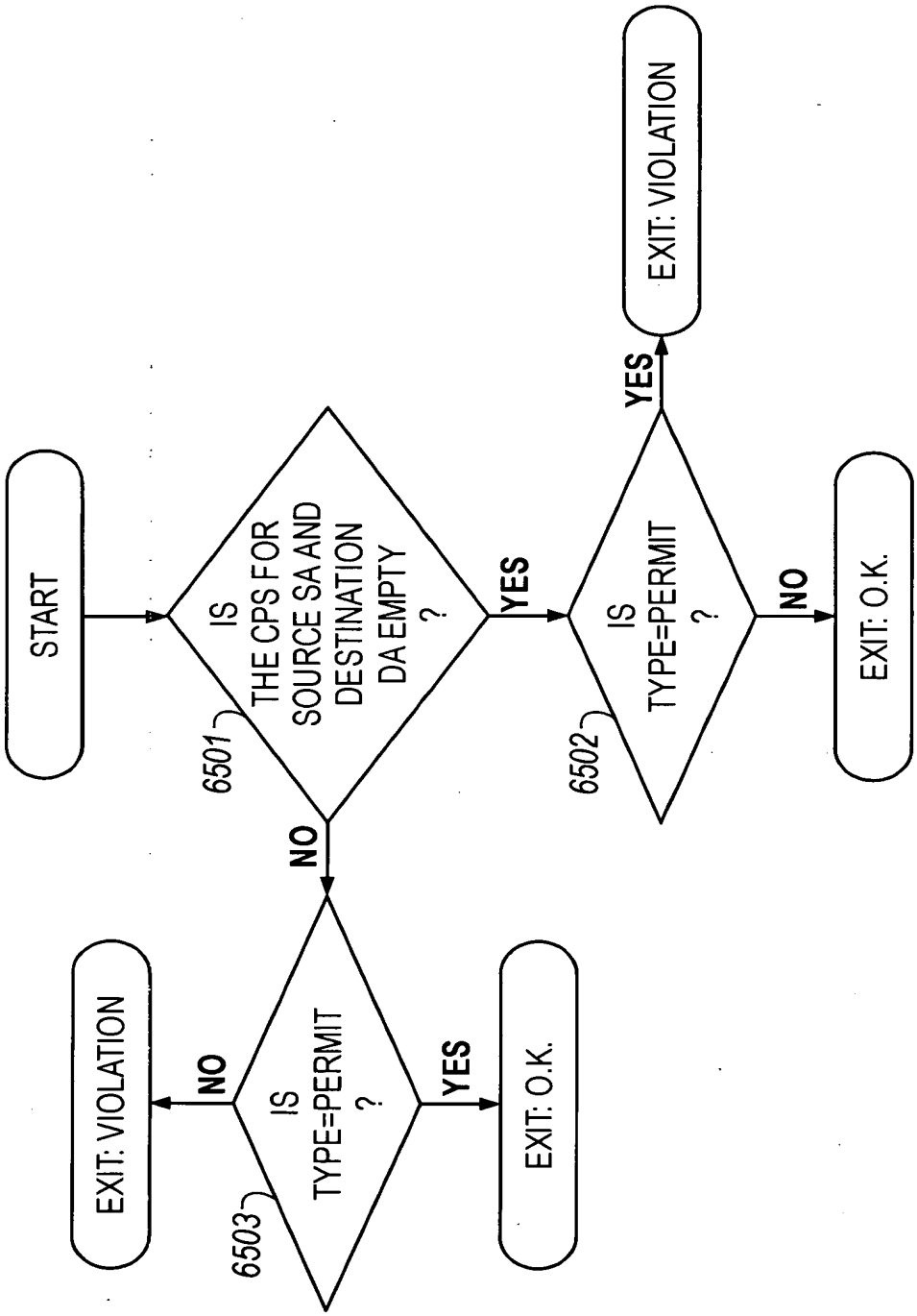


FIG. 65

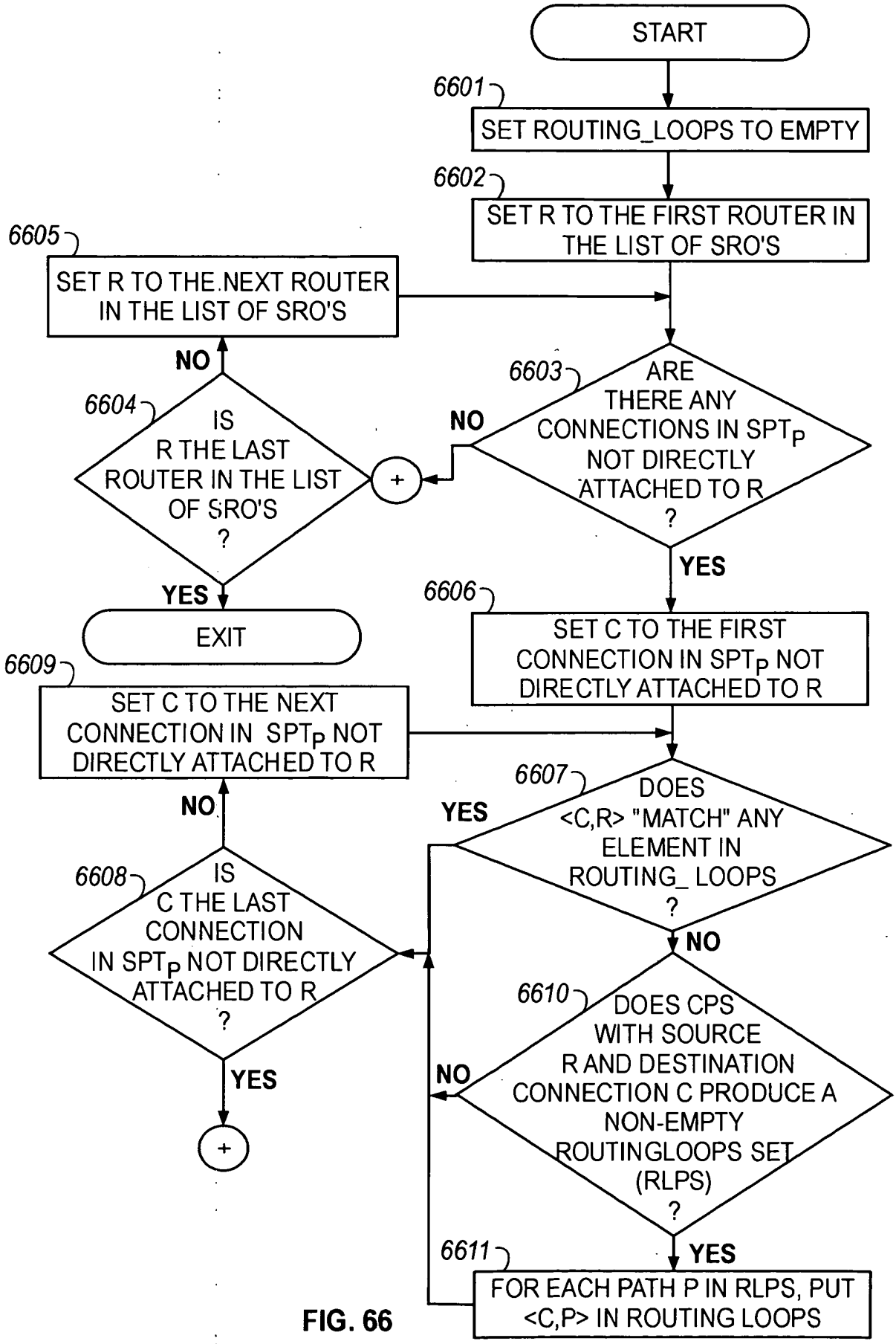


FIG. 66

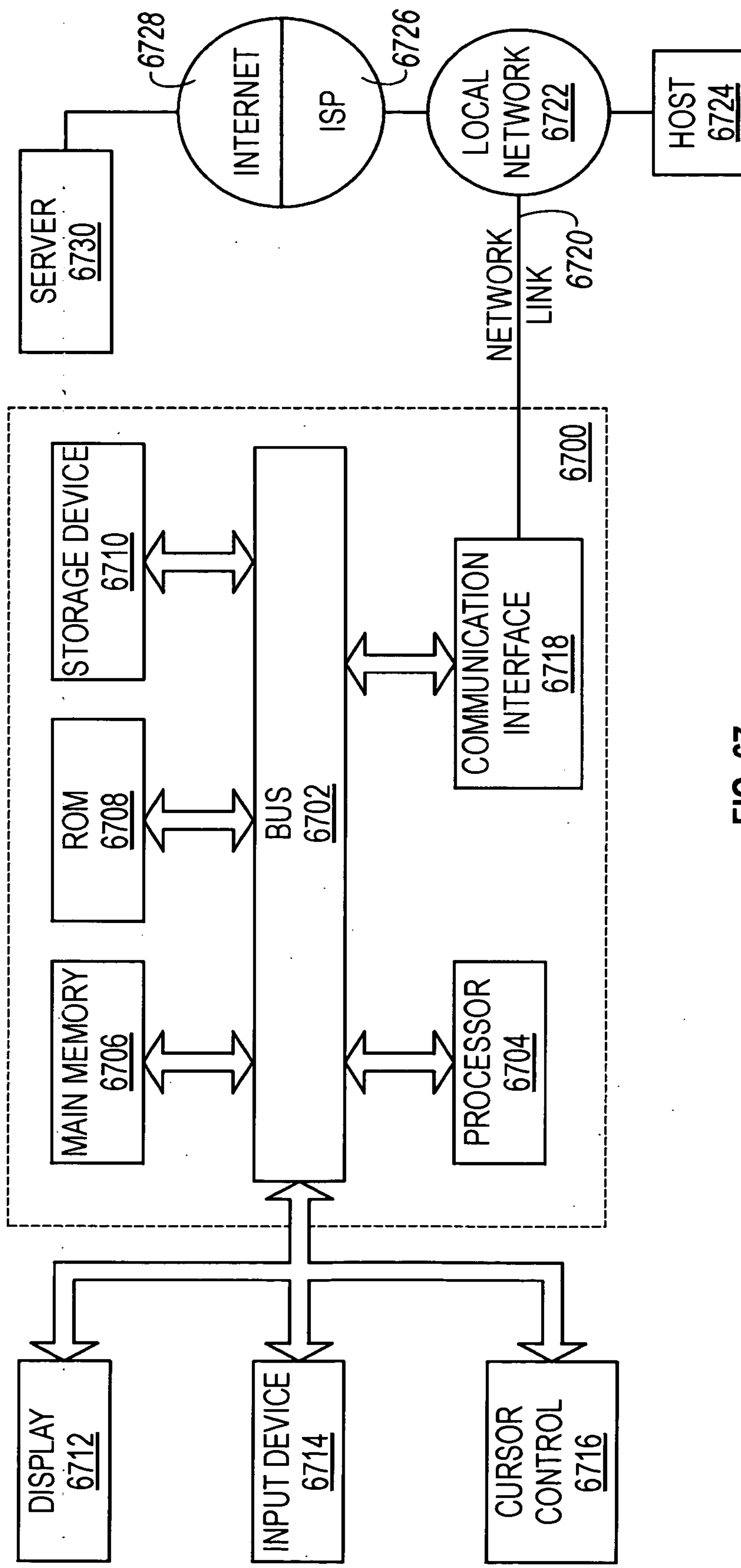

SERVER
6730
INTERNET
ISP
6728
6726
LOCAL
NETWORK
6722
HOST
6724
NETWORK
LINK
6720
6700
STORAGE DEVICE
6710
ROM
6708
MAIN MEMORY
6706
BUS
6702
COMMUNICATION
INTERFACE
6718
PROCESSOR
6704
DISPLAY
6712
INPUT DEVICE
6714
CURSOR
CONTROL
6716

FIG. 67